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Acorn COMPUTING

2 GREAT DISKS

NOVEMBER 1993 ACORN 32-BIT VERSION

Acorn COMPUTING MegaDisk Disk 1

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Crystal Maze

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Plus 4 MORE COMPLETE PROGRAMS

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Acorn COMPUTING MegaDisk Disk 2

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3 playable levels of **JAMES POND 2: ROBOCOD**

Morph-Face
Find out what you can do with Morpheus

EXCLUSIVE TO OREGAN

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ALDEBARAN
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Loads of great PD software

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NOVEMBER 1993 Vol.11 No.9 £3.95 HFL14.50

ACORN WORLD PREVIEW • LOW COST CD ROM DRIVE

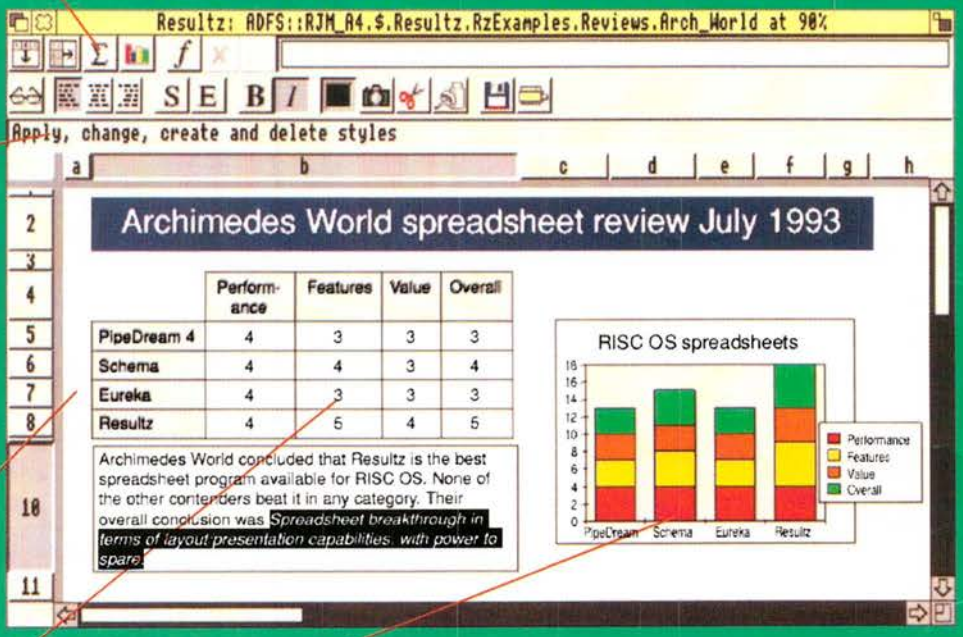
more news from Colton Software

New from the Archimedes' spreadsheet experts comes Resultz, the ultimate spreadsheet for RISC OS.

It's packed with powerful features to help you work fast, whether you're working on a classroom project or managing your business.

It recalculates faster than any competitor, and uses background recalculation so that you're never waiting for the computer to catch up. It will automate your work with the *Fill* and *Autosum buttons* - just select a group of numbers and Resultz writes a formula which adds them up automatically.

Resultz isn't just for power users. It's designed to help novice users work productively. Interactive help makes it easy to use Resultz' comprehensive set of functions. Every time you pick one of the 190 built-in functions from the selector, *tips on using it appear on screen.*


Resultz: ADFS::RJM_A4.$.Resultz.RzExamples.Reviews.Arch_World at 98%
Apply, change, create and delete styles
Archimedes World spreadsheet review July 1993
Perform-ance
Features
Value
Overall
PipeDream 4 4 3 3 3
Schema 4 4 3 4
Eureka 4 3 3 3
Resultz 4 5 4 5
Archimedes World concluded that Resultz is the best spreadsheet program available for RISC OS. None of the other contenders beat it in any category. Their overall conclusion was Spreadsheet breakthrough in terms of layout presentation capabilities, with power to spare.
RISC OS spreadsheets
Performance
Features
Value
Overall
PipeDream
Schema
Eureka
Resultz

Your data will look better than ever, with colourful charts incorporating your own pictures.

Unlike other spreadsheets, Resultz shows your pages on screen, so what you see on screen is exactly what will print out on the page (we call it *spreadsheet DTP*). The style editor places fonts and formats at your fingertips. It's easy to build *tables* and *forms*, and to add *charts* or *pictures* to worksheets.

And Resultz is just £119+VAT.

Resultz and Wordz are the first members of the FireWorkz suite of programs, designed to share the same intuitive easy-to-use interface, and to make it easy to share data between word processor, database and spreadsheet. . .

resultz

. ..when you need Resultz, send for your free brochure and demo disc

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postcode

COLTON software

2 Signet Court, Swanns Road,
Cambridge CB5 8LA
Telephone 0223 311881
Fax 0223 312010

Acorn WORLD 93 — 32-page supplement

Acorn have released a new version of the A5000 that runs over 30 per cent faster than existing machines. Read all about it in our special feature.

- Show news
- A3000 upgrade
- Low cost CD-Rom
- New books
- Newcomers
- S-Base in use

REGULARS

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There are lies, damned lies and the Press. Steve Turnbull explores the crimes DTP allows you to commit.

News 19
All the latest new of products and events taking place in the fast changing world of the Acorn computer.

Public Domain 41
Teri Paul is back again with her pick of public domain and shareware programs to enhance your computer.

Problem Solved 59
Our technical editor opens his mail and shares the secrets behind some tricky hardware problems.

Body Building 72
Mike Cook shows how to measure the turning of the axes on his computer-guided telescope.

Databay 78
Games gossip and up-to-the-minute news picked up by HAL, our electronic ear to the ground.

Graphics 92
Tesselating can be fun – as long as you do it with a friend. In this case it's your 32-bit Acorn computer.

Letters 96
Your opportunity to voice news, ideas and views on everything in the Acorn world from viruses to joysticks.

FEATURES

MegaDisk 4
What's in store this month on the two best cover disks available for the Acorn 32-bit RISC OS range.

BBC Disk 10
Full details on what's on the subscription disk for the 8-bit BBC Micro this month, and how to use it.

Communications 55
The ins and outs of communicating between computers via serial port, modem and telephone line.

Essential Paint 75
Steve Bruntlett concludes his art series with a glance into the future of bitmap graphics and how they interact with multimedia.

Essential Music 80
Ian Waugh looks at how you can connect Midi keyboards and a range of other instruments to your Acorn 32-bit micro and use software to play music through them.

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We survey the latest in educational software for the Acorn computers:
- Numbers Game
- Amazing Maths
- ArcVenture III
- Sumthing

Shorts 45
Some of the smaller utilities are put to the test:
- DiskCat
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- Squish
- Sound Lab
- Chemistry
- IronMask
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Compose World 52
Now you can create beautiful music with pictures. First appearing on the BBC Micro, this novel package makes its debut on the 32-bit machines.

Morpheus 61
Morphing is all the rage but does it have any practical use other than showing off the Acorn 32-bit? We explain it, experiment and speculate on its options.

Screenplay 65
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The wait is over. They're here at last – the complete guide to RISC OS 3. We see how useful these new programmers' manuals actually turn out to be.

THE MEGADISKS

Britain's best Acorn cover disks contain hours of fun and a host of useful utilities linked to our editorial features to make the magazine come alive on your desktop!

Full details about the packed MegaDisks — see Page 4.

- **Crystal Maze** Explore the Aztec Zone
- **Databay** Hal's peeks and pokes
- **Reader's own** Some very special utilities
- **Reviews Index** Who said what and when
- **Aldebaran** Join the space corps
- **Robocod** A fishy adventure in jelly
- **MorphFace** Satirical or sartorial elegance
- **8-bit programs** Make use of your BBC B
- **Public Domain** Teri Paul's selection

Subscribe now!

SUBSCRIBE to *Acorn Computing* and you'll get an amazing value-for-money deal that beats all our rivals. Not only do you get a whole year's worth of issues for LESS than any other Acorn magazine, 32-bit owners get TWO disks every month.

See Page 29 for details of this unbelievable offer.

If you have a BBC Micro, *Acorn Computing* is the only newsstand magazine that still supports you. Next month we're offering the complete commercial game, Q-Master, plus programs for our series on practical compression.

To subscribe turn to Page 29 now.

• *The editorial and many of the adverts in this magazine were prepared using Impresssion and ArtWorks by Computer Concepts.*

GET YOUR NEWSAGENT TO RESERVE A COPY – SEE PAGE 28

The MegaDisks

MegaDisk 1

- **Crystal Maze**
  Explore the Aztec Zone
- **Databay**
  Hal's peeks and pokes
- **Reader's own**
  Some special utilities
- **Reviews Index**
  Who said what and when

MegaDisk 2

- **Aldebaran**
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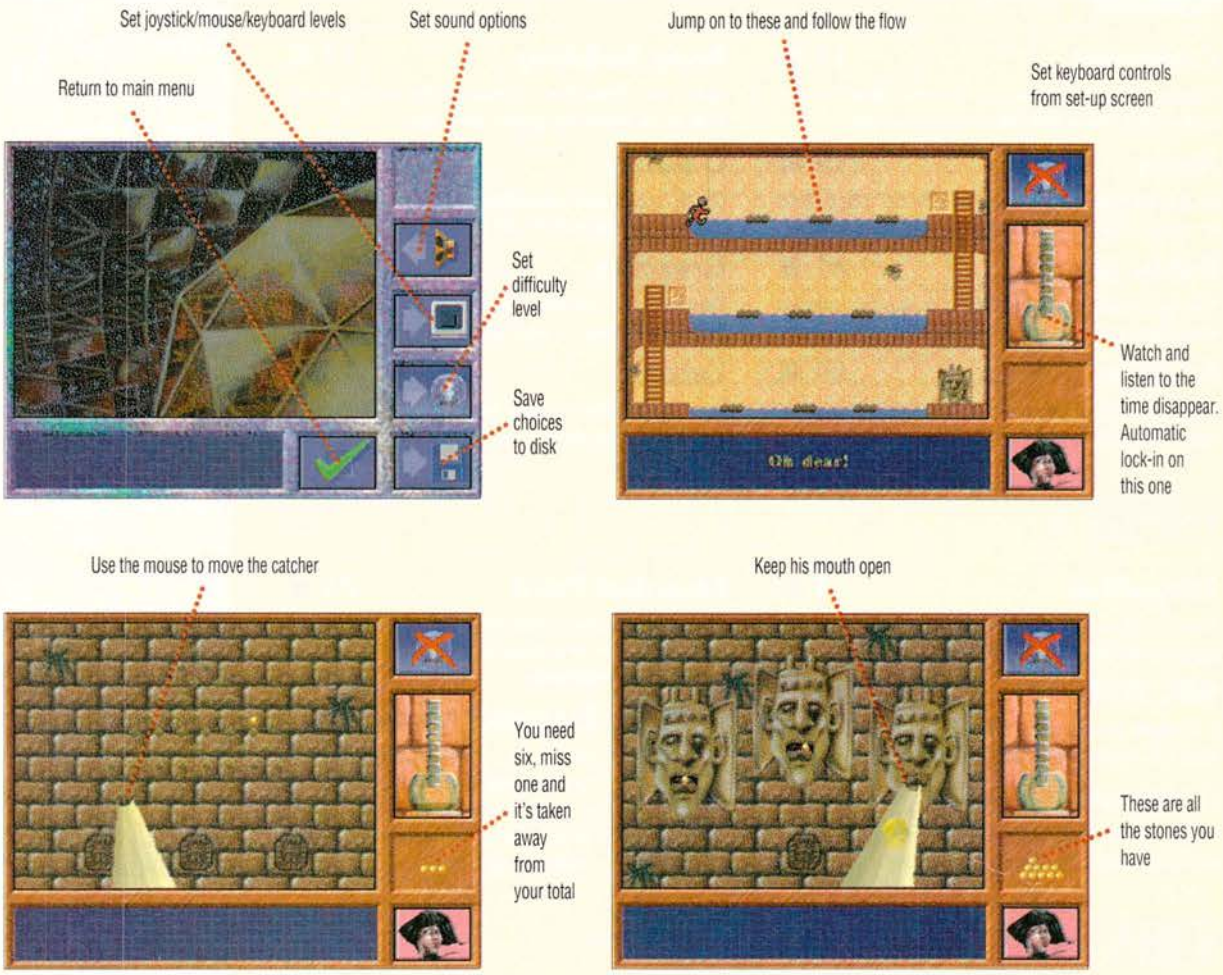
  Satirical or sartorial elegance
- **8-bit programs**
  Make use of your BBC B
- **Public Domain**
  Teri Paul's selection

Crystal Maze: Life in the dome


Set joystick/mouse/keyboard levels
Set sound options
Jump on to these and follow the flow
Return to main menu
Set keyboard controls from set-up screen
Set difficulty level
Save choices to disk
Watch and listen to the time disappear. Automatic lock-in on this one
Use the mouse to move the catcher
Keep his mouth open
You need six, miss one and it's taken away from your total
These are all the stones you have

WELCOME to the Aztec Zone. Your team has been selected and the computer has chosen the games – one physical, two skill and one mental. Are you up to the challenge? Will you be the one to get wet?

This very special version of the Maze has been created by Sherston Software (0666 840433) exclusively for *Acorn Computing* readers and aims to whet your appetite for the real thing: A team event over four zones and 24 different games all for £39.95.

There is one chance to succeed at each game with a maximum number of four crystals available. However, you will be able to go back to the zone for as many tries as you like. What's more, we'll even let you adjust the difficulty level.

What are you waiting for you, the clock is against you ...

Getting started with the MegaDisks

THE programs on these disks are stored in a highly compressed format which sometimes enables as much as 1.6Mb of programs and data to be stored on a 800k floppy disk

The procedure for running the programs is very straightforward and does not require learning any special methods or techniques.

Switch on your Acorn micro, put the disk in the drive and click the drive icon. Now double-click !ACmenu – there's a short pause while it scans the archive then it displays a window of the contents.

You can treat this new window like any other one for viewing disk contents, you can run programs and open directories by double-clicking them.

Large programs must be unpacked by dragging on to a separate disk before being run. Some may have an !Install program that will do it for you.

We recommend that you always read the !ReadMe files or access the help information via the Help button.

RoboCod: A fishy experience

THREE of the levels of the full game are on this month's MegaDisk 2, exclusive from GamesWare (0703 456523). The full game costs £25.99 and sets you on a journey of 80 levels of puns and adventure. The *Acorn Computing* version starts outside a castle leading to the levels.

Your mission, should you choose to accept it, is to thwart the evil plan of Dr Maybe, rescue any penguins you meet on the way and save Santa's toy factory. His minions will try to delay you but all you have to do is jump on them – before they jump on you.

You can explore the castle and open doors at will, to pop into a world of jelly inhabited by a strange array of creepy crawlies or into a place that will introduce the terrors of tennis balls. And it's here that you'll have to use all your skills to save those benighted penguins. Complete each level by reaching the exit beacon.

The finished version will have music and sampled effects but this special *work in progress edition* doesn't contain the frills.

You can traverse the terrain using the following:

Keys	
Z	Left
X	Right
'	Jump
/	Duck
Space	Extend body

James is a very suave fish who is able to grab hold of ceilings in a very agile way.

Pressing the spacebar will allow him to stretch to great heights – try it and see. Good luck.

● *Use the jelly to give you extra bounce*

● *Now you've got up there what are you going to do?*

Desktop+: Better workspace

THIS collection of utilities adds a variety of features to your everyday RISC OS 3 desktop.

As well as solid semi-transparent drags you can use your own sprites for directories and add fancy text to the desktop all working very nicely with Acorn's NewLook icons and backdrops.

To find out exactly what you get, double-click !Desktop+ and !Help from your Apps folder. Move the pointer over each of Desktop+'s menu entries and you'll be given a few details.

You can find out a bit more by pressing F12 to go to the command line and typing:

```
Help Desktop+_Options
```

To use the sprite directories option take a look at the examples inside DirSprites. Four types of icon are required. For example, for a directory called *games* they would be:

#games	Standard icon
sm#games	Standard small
$games	Highlighted icon
sm$games	Highlighted small

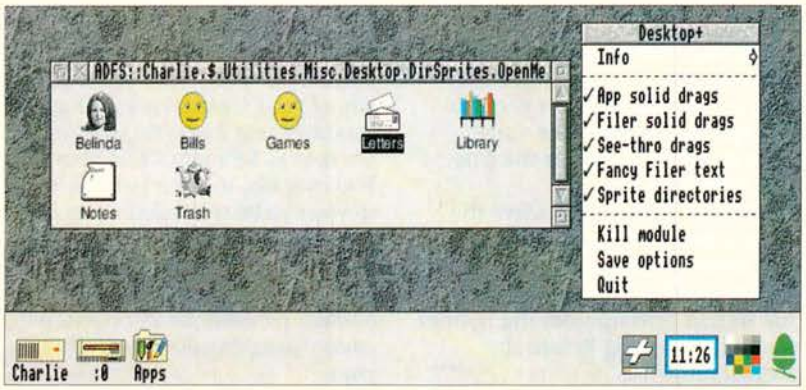
If you haven't supplied all the options Desktop+ behaves just as the Filer does and shrinks or highlights the main icon.

!Desktop+ includes all C/assembler program/module source code so you can see how it's done.

If you don't want these files, you can reduce the disk space occupied from 97k to 34k, by deleting Makefile and directories c, o and s.

If you load the module Desktop+ directly from a Boot file and don't need the !Desktop+ shell, you can further reduce disk space occupied to only 4.5k.

Michael Rozdoba



● *You can set the icons for your directories which change when highlighted*

FAULTY DISK?

If either of your cover disks has a physical fault – doughnut won't rotate in the sleeve, disk errors and so on – please return it for replacement to:

PC Wise Ltd
Dowlais Top
Business Park
Dowlais
Merthyr Tydfil
Mid Glamorgan
CF48 2YY

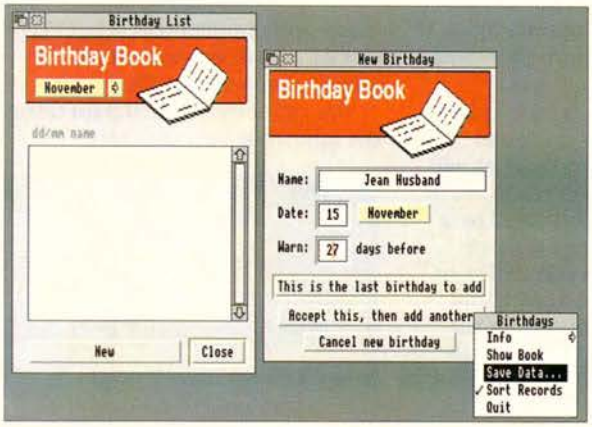
If there seems to be a fault with one of the programs please contact us by post describing your machine set-up and exactly what happens when you run the program.

Wanna sell some software?

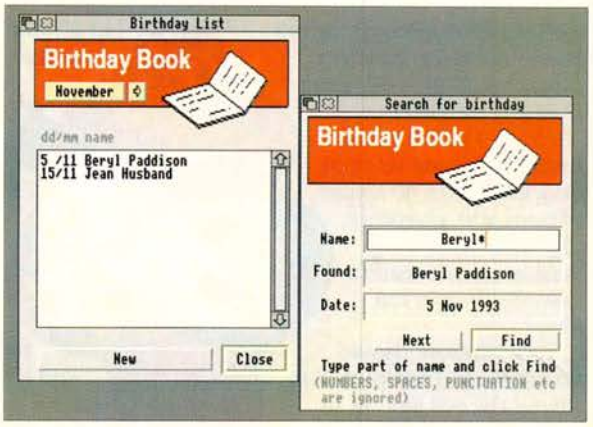
ACORN COMPUTING is always in the market for good quality applications, utilities and games to put on the MegaDisk and Subscription disk, for 32-bit and 8-bit machines. If you think your program has got what it takes just send it on disk to:

MegaDisk Submissions, Acorn Computing, Europa House, Adlington Park, Macclesfield SK10 4NP.

Birthday Book: Remember those days



● *You can set the warning from 1 to 99 days*



● *The search option is particularly useful*

BIRTHDAY Book is a fully RISC OS compliant birthday diary which can hold up to 546 red letter days. You can set the number of days before an impending birthday. You are warned about it and if you're within the danger period a warning is given when the program is loaded.

This program is specifically for birthdays and is much better than using Alarm for the same purpose because of its design. There are two sets of icons – 3D and 2D. Though the 3-D look better they only work on RISC OS 3 machines and the right ones are loaded automatically.

Birthday Book runs the first time a directory viewer is opened in it but not when you open the *Acorn Computing* menu system containing the program. You must copy Birthday Book on to a new floppy disk or to your hard disk as you won't be able to save on the MegaDisk as there isn't any room.

When auto-booted, an immediate check is performed on the birthdays and if a birthday is imminent a warning window appears. When loaded by a boot file the program will quit itself if there is no warning to report. This ensures you'll always be warned of a birthday, but the program won't occupy valuable ram space if none is due.

You can load Birthday Book in the usual way on the iconbar by double-clicking and a warning window will appear if there is a birthday imminent, but obviously will not quit if not.

On the icon bar there are three options plus quit:

Show book: Opens the birthday book defaults to the current month.

Save data: Needed to update the birthday book on disk. Note, the information is not automatically saved, but you are warned before quitting of any unsaved data.

Sort records: By default there is a tick by the side, which indicates the records will be sorted before being displayed in the book. This option should only be turned off when you have a lot of records, to speed up updating of the windows. When left off the birthdays are displayed in the order they were entered.

When updating a month's birthday list the hourglass is shown with a percentage below it. When it reaches 100 per cent the percentage will switch off. The time after this until the hourglass disappears is the time it takes to sort.

To start to use the Birthday Book click Select on the candle icon. At the top is the name of the month being displayed. This will also display Warnings where there are any. By clicking on the month or the arrow beside it, you can change this.

You can start by adding your own birthday. Click on the large New icon at the bottom and a window will appear. Type in your name, press Return and type in the date you were born in.

Click on month, and select the correct one. Now press Return twice and your birthday will be registered. To add another birthday, click on the second icon up from the bottom instead of pressing Return the second time.

You can change the warning days number so you can be warned longer in advance about relatives living in Australia, than for your next door neighbour's birthday. Leap years, lengths of months and so on are observed.

Click on the month of your birthday at the top of the book window.

If this is within the seven days warning date, it will be red – otherwise black. If you click any button on your birthday, a menu will appear giving details and the ability to edit the details, delete it or accept the warning.

The Accept Warning will be greyed out, except when the birthday is in red. Remember though when you accept a warning you will not be reminded again until the next birthday, so it is best to only click on Accept Warning when you are sure you won't forget.

Finally by clicking Menu over the birthday book window – not over the date, or any birthdays – a menu appears which can tell you how many records are present and so on. In addition, a standard search facility is included.

Theoretically people with birthdays on February 29 should only get your consideration every four years, but most people celebrate on one of the adjacent days.

The program will only warn for February 29 every four years. So if any of your friends (or you) have this birthdate it may be wise to give the date as February 28 or March 1. You may like to enter two birthdays so you can be reminded when it is their official birthday.

● *Trivial fact: If you kept your Arc until 2100 you would not get a birthday on February 29 because only century years divisible by 400 are leap years.*

Simon Weaver

Filer Window Keys: Open access

THIS allows you to access the keyboard shortcuts when looking at filer windows. This utility works on the window currently under your pointer but only if the caret is not currently claimed.

Control+Z	Select all
Control+X	Clear select
Control+U	Up dir
Control+X	Delete selection

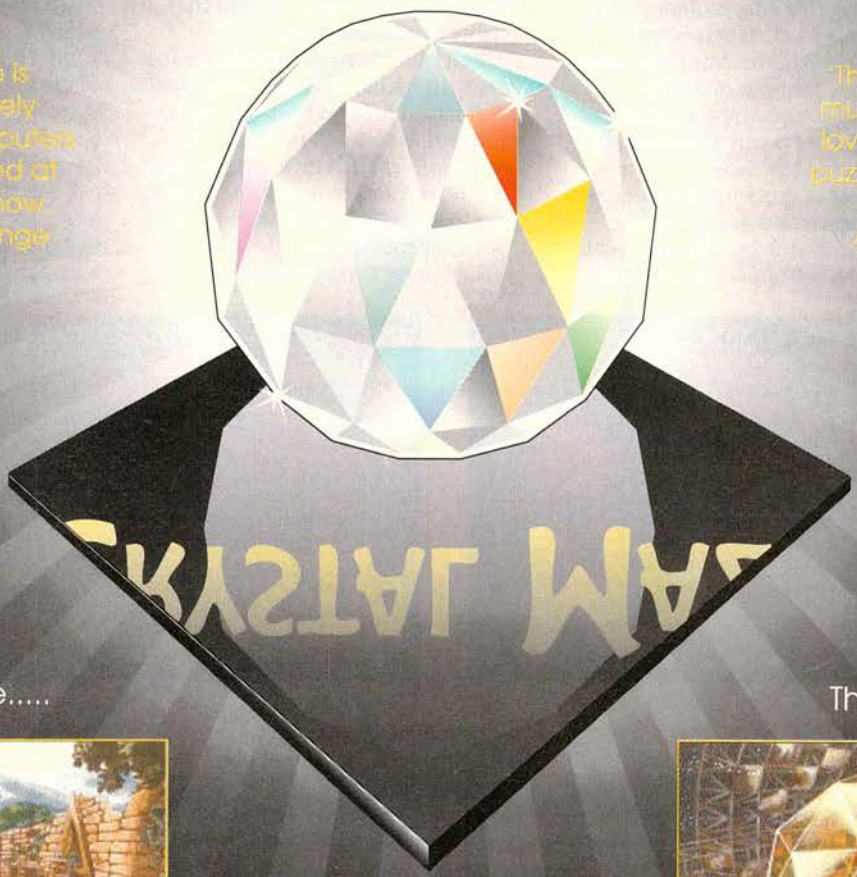
Paul Mason

The Crystal Maze is a Chatsworth Television production
for Channel 4 based on ideas by Jacques Antoine © 1990

THE CRYSTAL MAZE

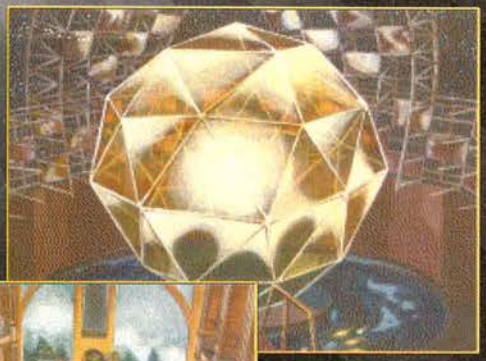
The Crystal Maze is available exclusively for Acorn 32 bit computers and will be launched at the Acorn World Show Take up the challenge on STAND 35

The Crystal Maze is a must for everyone from lovers of mind-bending puzzles to joystick -frenzy enthusiasts'
Acorn Computing October 1993



Into the Aztec zone.....

The final challenge!



Now you can play TV's No.1 Adventure Game

Try your hand at a game of skill ....

The Ocean zone contains new challenges ....

Sherston Software
Swan Barton, Sherston,
Malmesbury,
Wiltshire SN16 OLH
Tel 0666 840433
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Visa/Access: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

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Signed _____

MorphFace: Changing faces

THIS is an application designed by Oregan Developments (021-353 6044) for you to show how Morpheus – which costs £34.95 – can be used.

MorphFace illustrates one of the interesting side effects of morphing, *distortion*. As well as achieving smooth translations from one image to another, you can distort by stretching or squashing a particular part of it. This is very effective when using the human face.

The sort of quality you can expect from Morpheus depends on the quality of the images you start with. Morpheus will allow you to morph anything from a simple Mode 15 sprite to a 24-bit colour Clear file or 15-bit CC Colourcard sprite.

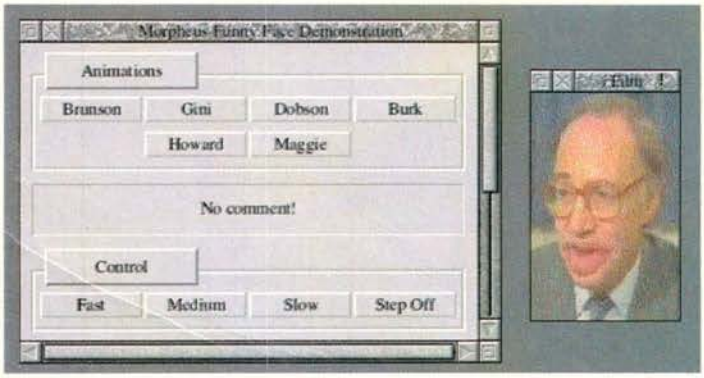
Obviously we have had to sacrifice the quality of these demonstration animations, in order to fit this amount on the MegaDisk, but the quality is still very good.

On a basic A310 or A3000 running Arm2, 10 frames of animation, from a full screen Mode 15 image, can be morphed in just 145 seconds. The animations on this disk, all took less than 60 seconds to morph. Machines running ARM2.5, or ARM3 will, of course, be much faster.

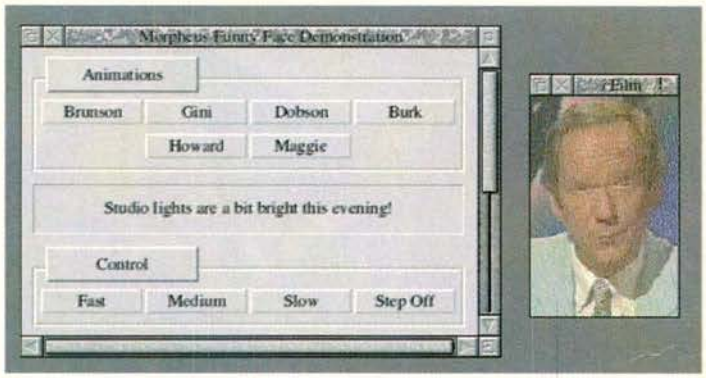
The Funny Faces demo is very simple to use. Click on the icon in the filer window to load the demonstration to the iconbar. If you are not already in a 256 colour mode switch to Mode 15 or 28.

Click on the iconbar icon and you'll be presented with the control panel. Click on one of the animation icons – try Brunson first. The speed of the animation can be modified from the control panel, although relatively little change in speed will be noticed on ARM2 machines.

Clicking on the Step icon will freeze the animation but clicking on the animation picture itself will advance one frame at a time.



● *Morpheus distorts the lips...*



...and eyes

Backgammon: It's war

PLAY is between two armies of 15 pieces on a 24-*point* board. Each player throws a dice and the one with the highest score moves first. These dice are used by the first player on his move.

The object is to move all your pieces around the board and off the end before your opponent. Your pieces are blue and move anti-clockwise, the computer's are white and move clockwise.

The roll of two dice is used to move your pieces by the number of points shown. Each dice is considered as a separate move and different pieces may be moved with either dice, or the same piece may be moved twice. A double counts as four moves of the value shown.

If any *point* has more than one piece of the same colour, it's *blocked* and your opponent can't land there. If a point has only one piece and the opponent lands on it, that piece is *hit* and is moved on to the *bar* which separates the board.

This piece must restart the journey around the board. If either side has any pieces on the bar they must be moved back on to the board before any other piece may be moved. When all one player's pieces have been moved into its inner quadrant, *bearing off* begins.

You must move off the board with an exact throw if possible. If you can't use the dice to bear off exactly, you must use it up as an ordinary move. If this is not possible, you must bear off from the highest possible point. To move your pieces click on the letter, on the dice and confirm by clicking on Move.

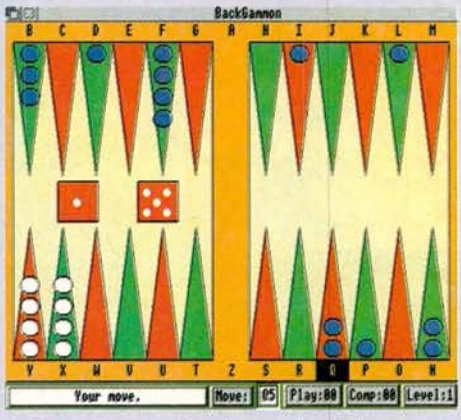
When an army has moved all its pieces off it is awarded points according to the nature of its win (see panel).

Play takes place on the desktop and is controlled via the mouse. The level of play may be adjusted by entering a new value on the menu at any point during the game. Higher levels may take some time to evaluate.

To start, click on Move to roll for the first move. Alternatively, click Play or Comp to make the selection.

To enter a move click on the letter of the point you wish to move and the dice you wish to use. Illegal moves will not be allowed and you will have to re-enter your choice.

Duncan Cobb



● *The computer plays better than I do*

Score Card

Loser has borne off any of his pieces
1 point for a standard win
Loser has borne off no pieces but has got all his pieces out of the winner's inner quadrant
2 points for a gammon
Loser has pieces on the bar or in the winner's inner quadrant
3 points for a backgammon
No doubling-cube is provided since no gambling is allowed.

Aldebaran: Seek and destroy

THIS space arcade adventure comes to you from Software Evolutions (01041-31-7476531) and normally retails at £25.50. This specially created version loads on to the iconbar and is loaded in the normal way.

You can explore the game's menus but some of the features have been disabled. In the main menu, use the right most icon to get back to the desktop. The green arrow is the exit to the planet surface, where you can fly around and fight aliens.

In this action scene, the left button controls thrust, the middle button activates the extra weapon – the spin fire – and the right button fires.

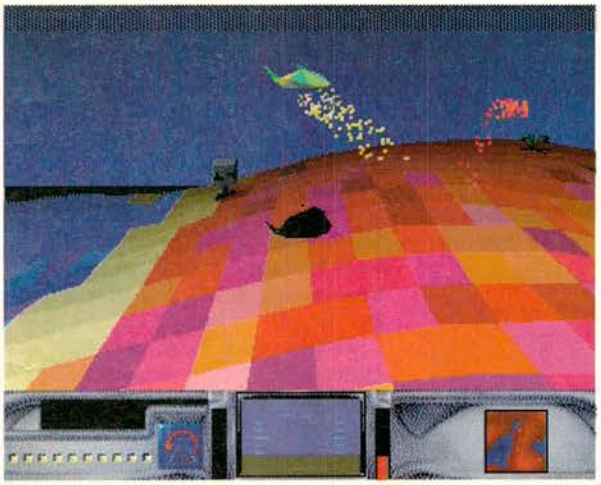
To get back to the planet base find the blue square on the map. Once you're standing over its center, click the middle button.

Flying high brings you to the orbital mothership. On the bottom of the screen are three buttons – the left one takes you to the control room while the center sphere gets you back to the outside view mode. This is the one selected when you first get there.

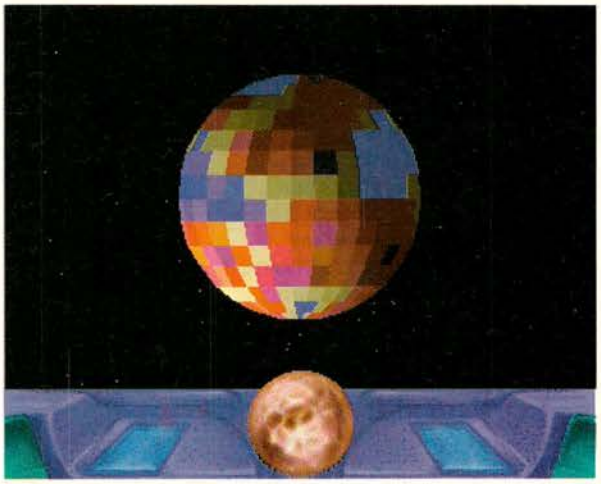
In the control room is a list of planets on the left and a main window on the right. The latter shows the distances between planets – Nubium and Vela. Clicking with the middle button over the main window toggles the distance display and a 3-D view of the solar system.

You can zoom in and out with the left button and rotate with the right.

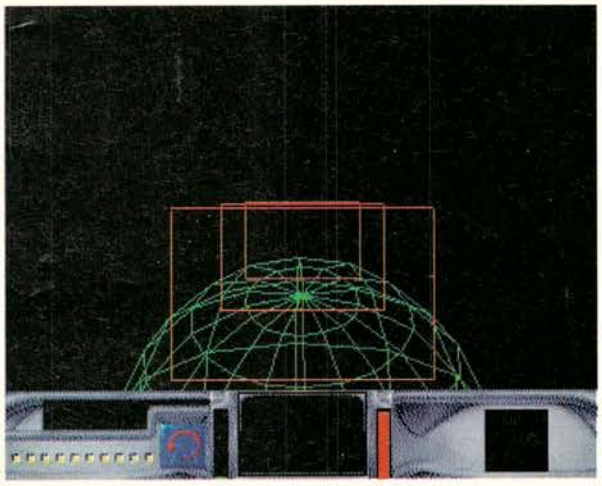
To start hyperspace travel to another planet, double-click on its name in the list. After the travel, you'll find yourself in the outside view mode again. Clicking on the 3-D planet in the outside view mode starts the landing.



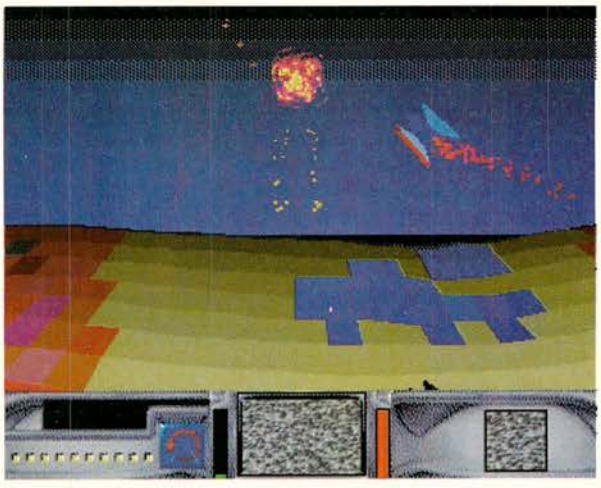
● *Traverse the Zarch-like worlds*



● *There are many worlds – here's one ripe for exploration*



● *Getting ready for planetary re-entry*



● *Oops ... must go back for another ship*

8-bit programs

THESE programs are for people who want to download them via a serial link to their BBC B or run them via the !65Host. More details on the programs themselves are on page 10 while you can read how to use the !65Host on page 26 of this month's special supplement.

- Address Book
- All the Colours of Darkness
- Three Compression utilities

Public Domain

- HourMake
- 3D Enhancers
- Quadra
- Opener
- Swap CFS
- Wiper

For more details see the PD column on page 41

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AddBook: We've got your number

DATABASES are everywhere and come in a variety of guises – telephone directories, the DVLC computer, teletext... the list is endless.

One database most people possess is a home-grown address book, consisting of the names, addresses and telephone numbers of both business and social contacts. This program, *AddBook*, turns your favourite 8-bit silicon-based friend into a fully-functional electronic address book.

For friendliness and ease of use the user interface is designed around bar-driven menus. An option can be highlighted using the up and down cursor keys and selected with Return.

For simplicity, all data is held in memory rather than using random access filing techniques.

Add new data selects the first available record for data entry. Input is field by field, the maximum permitted string in each being:

Field		Maximum entry length
Surname		20
Forename		15
Address	field 1	20
	field 2	20
	field 3	15
	field 4	15
Postcode		9
Phone No		14

The input routine is error-trapped to prevent invalid entry crashing the program: A bell will sound if you attempt to enter more data than allowed in the given field or try deleting more than you have typed.

When using the search facility bear in mind that the program is case sensitive.

For this reason it pays to enter your data in a consistent fashion: Lower case with initial capitals or full block capitals are the usual choices.

The sort function uses a simple string comparison method to arrange records alphanumerically, starting with the surname field. Note that capitals take precedence over lower case – *A...Z* before *a...z*, not *Aa...Zz*.

Should you accidently engage either of the load and save options, it can be cancelled by pressing Return without entering a filename – the program does not attempt to use a null filename.

The constant *K%* in line 40 determines the maximum number of records in the current file and can be altered to any value – memory permitting – from the default 50.

Note that the time taken to sort data will increase geometrically with larger values of *K%*.

Stephen Wade

● *Create your own DIY address book*

Wanna sell some software?

Acorn Computing – the only newsstand magazine continuing to support your BBC Micro/Electron – is always on the lookout for good quality software to feature on the 8-bit subscription disk.

If you think your program has got what it takes just send it on disk to:

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- All your own work
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- We have your permission to use it

Alone in the dark

IT is 1986, and man – in the form of the Universal Transmitting Company – has finally discovered how to build matter-transmitters. As yet, the design is not quite complete and a few problems remain.

You are Jan Darzek, a detective with some money invested in Universal Trans, now one of the largest and most successful companies in America. A few days ago, you received a mysterious phone call urging the sale of all your stock to an anonymous buyer.

Just 48 hours later the problems with the matter transmitters were solved and Universal Trans was opened for business.

After a further couple of days, you receive another telephone call – this time from Thomas J Watkins III, manager of Universal Trans. He refuses to discuss what it is about but asks that you get to the Universal Trans offices as soon as possible.

In this text-based adventure – *All The Colours Of Darkness* – you must discover who it is wanting Universal Trans to fail and stop them if possible. You have Watkins – a powerful an influential businessman – on your side as well as the full backing of Universal Trans itself.

Against you are those people who have already sabotaged Universal Trans equipment, injuring several employees. You do not know who they are, or where to find them.

To help you succeed in your mission, various characters will appear who you can talk to, gaining much useful information. Type *TALK TO <character name>* to get information or help from them.

Adrian Jackson and Andrew Wall

Adventure Keywords

DROP	LOAD GAME	SAVE GAME	WEST
EAST	LOOK	SOUTH	
GET	NORTH	TAKE	
INV	QUIT	TALK TO	

Compress: Files come under pressure

LAST month we looked at the Huffman encoding technique where frequently used characters are stored using short codes and infrequent ones, long codes. This time we will examine a more intuitive approach – removing repeated sections.

The simplest example of this is Run Length encoding, used by most screen compression programs for 8-bit micros. It works by finding long sequences of the same byte value, replacing them with a single copy and the number of times it occurs.

This system has obvious problems: What happens to long sequences of bytes containing no adjacent repeats? Should they be output as sections with length one, or be preceded by a code indicating a sequence of uncompressed data? This is the reason why many of these systems are ineffective with heavily dithered images.

With emphasis only on single byte repeats, sequences of alternating bytes aren't spotted as candidates for compression.

A better approach is the Sliding Dictionary. Instead of looking for repeats of a single byte, it stores the last *n* characters in a buffer and examines whether the current sequence has occurred before. If so, the distance – the number of characters to go back – and length are output, otherwise the byte is left unchanged.

As an example, consider the input sequence in (a), ignoring spaces. At this stage nothing has been processed, so the current input position, shown by an arrow, is at the beginning of the input and there is no output.

The first character is a B: As there isn't another one before the current position it is output unchanged, (b).

A and C also have no matches, but the following A matches the first which came two characters earlier. This is a repeat and is replaced by *2,1* showing the previous pattern starts two characters back and has length one, (c).

B repeats in the same way. The next A matches with the first and second occurrences. Our aim is to find the best match and as AB can also be matched this overrules the single A's. This too can be improved upon.

The decoding process reconstructs the data by copying from its buffer moving left to right. So, once it has copied the first AB, it will have ABAB. At this point, it will be set up to copy from the AB just created, and by taking advantage of this the whole ABABAB sequence can be matched. Try decoding the final output if you are unconvinced, (d).

The last part, BACAB, is simply a repeat of the first five characters, (e).

A buffer of 256 characters is used by the *SLIDE?* system which attempts to find repeats with maximum length 256. These allow matches to be stored in two bytes. However, there is still the problem of uncompressable bytes.

As each byte is processed, the sliding compression part of the program will return the best match. This will be of length zero (no match) or greater than two – nothing is gained from shorter matches.

Each is stored until there is enough to make up a block. These hold up to 15 uncompressed characters followed by up to 15 matches. The blocks are output as a count byte containing the number of characters and matches, the uncompressed characters and the match codes.

There are three source programs this month that assemble four star commands.

Listing I produces *SLIDEC* and *SLIDED*. These work in the same way as last month's *HUFFC* and *HUFFD*. To compress a file called *FROG* to produce *TADPOLE* type **SLIDEC FROG TADPOLE*, and to decompress it, **SLIDED TADPOLE FROG*.

Listings II and III assemble *SLIDESC* and *SLUFSC*, which allow compressed screen pictures to be loaded directly into screen memory. The former will load files compressed with *SLIDEC*, the latter those processed by *SLIDEC* then *HUFFC* (given last month).

Imagine a picture of a person called *ADULT*.

To compress this for both decoders, you would type **SLIDEC ADULT CHILD*, followed by **HUFFC CHILD BABY*. *CHILD* could be displayed using *SLIDESC* and *BABY* with *SLUFSC*.

There are three reasonable combinations of the compression routines given so far:

- *HUFFC* alone
- *SLIDEC* alone
- *SLIDEC* followed by *HUFFC*

Other combinations usually produce larger files.

The best choice depends upon the type of source file. Pictures are usually better compressed by *SLIDEC*, text files by *HUFFC*. Usually, if a *SLIDEC* output file is large *HUFFC* will give an improvement.

To avoid confusion about how a particular file was compressed arising, a naming scheme useful. I choose to put *HUFFC* files in directory *H*, *SLIDEC* in *S*, and the combination in *C*.

- *Next month, some Basic to give even more meaning to the question: How did I ever manage without compression?*

Andrew Bennett

Various stages of Sliding Dictionary compression

```
(a)  In:  B A C A B A B A B A B B A C A B
          ^
     Out:
(b)  In:  B A C A B A B A B A B B A C A B
          ^
     Out: B
(c)  In:  B A C A B A B A B A B B A C A B
                ^
     Out: B A C 2,1
(d)  In:  B A C A B A B A B A B B A C A B
                                ^
     Out: B A C 2,1 4,1 2,6
(e)  Out: B A C 2,1 4,1 2,6 11,5
```

Reference

Ziv J., Lempel A., 1977, *A Universal Algorithm for Sequential Data* Compression, IEEE Trans. Information Theory 23:3, pp. 337-343.

Christmas treat

TO help you while away those dark winter nights, we have arranged for our 8-bit December disk to feature the excellent *QMaster* pool simulation.

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Pendown	*Longman*	£46
Pendown Etoiles	*Longman*	£46
Pendown Outline Fonts	*Longman*	£19
Pendown Plus	*Longman*	£68
Personal Accounts	*Apricote*	£29
Perspectives	*TechSoft*	£54
Pesky Muskrats	*Coin-Age*	£19
Phonic Games	*Fisher-Marriott*	£28
Photopia	*CIS*	£POA
Picture Book	*Triple R*	£15
Picture It!	*Appian*	£29
– Topic discs	each	£9
PinPoint	*Longman*	£65
– site licence		£386
PipeDream 3	*Colton*	£72
PipeDream 4	*Colton*	£119
PipeDriver Dot 1	*ICS*	£10
Pipe Mania	*Empire*	£18
Pirate, age 8-14	*Chalksoft*	£19
Placard	*ICS*	£10
– site licence		£30
Plague Planet	*Alpine*	£13
PlayBack	*RISC*	£18
Play It Again Sam 1	*Superior*	£20
Plot	*Clares*	£POA
Podd, KS1,2	*ESM*	£25
Podd – Welsh, KS1,2	*ESM*	£38
Polyominoes	*Topologika*	£26
Populous	*Krisalis*	£22
Poster	*4mation*	£75
PowerROUTER	*Silicon*	£159
Prehistoric Animals, sprites	*Micro Studio*	£16
Premier	*Circle*	£71
– DataBase	*Circle*	£25
– WordProc	*Circle*	£25
Presenter GTi	*Lingenuity*	£66
PrimeArt, KS1-4	*Minerva*	£68
PrimeMover, KS2-4	*Minerva*	£75
PrimeSolver, KS1-4	*Minerva*	£POA
PrimeWord, KS2-4	*Minerva*	£51
Printer Drivers, RISC OS: Canon BubbleJet, Canon LBP, Canon PJ1080, ColourCel, Epson JX, Epson ESC-P2, HP, Integrex 132 – each	*Ace*	£19
Deskjet 500C, Epson / Star colour – each	*RISC*	£15
ProDrivers: Canon LBP8, Epson ESC-P2, HP Colourjet – each	*Ace*	£37
TurboDrivers: Canon, Epson Stylus 800, HP – each	*CC*	£42
ProArtisan 2	*Clares*	£109
ProCAD, KS4	*Minerva*	£394
Programming in ANSI Standard C on the Archimedes	*Sigma*	V0 £15
Prophet (requires 2 Mb)	*Apricote*	£145
Prophet Entry Level	*Apricote*	£10
ProSHEET	*Silicon*	£36
Protext	*Arnor*	£117
Provocator	*Computer Tutorial*	£15
Puncman 1 and 2	*Chalksoft*	£16
Puncman 3 and 4	*Chalksoft*	£16
Puncman 5 to 7	*Chalksoft*	£18
Punctuate	*Xavier*	£31
Punctuate!	*Topologika*	£25
QDBug	*Leading Edge*	£58
Quest for Gold	*Krisalis*	£19
QuicKey	*ICS*	£10
– site licence		£30
Real McCoy 2	*Fourth Dim*	£23
Real McCoy 3	*Fourth Dim*	£23
Real McCoy 4	*Fourth Dim*	£27
Recall, age 8-13	*Sherston*	£37
Redshift	*Minerva*	£10
RemoteFS	*Atomwide*	£45
Render Bender 2	*Clares*	£77
Repton 3	*Superior*	£19
Resultz	*Colton*	£109
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Revelation 2 CD Rom	*Longman*	£98
Revelation ImagePro	*Longman*	£127
Reversals	*Chalksoft*	£17
Rhapsody 2	*Clares*	£44
Rhapsody 3	*Clares*	£79
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RiscBASIC Compiler	*Silicon*	£77
RiscForth Compiler	*Silicon*	£72
RISC OS 3 First Steps	*Dabs*	V0 £POA
RISC OS 3 Programmer's Reference Manual	*Acorn*	V0 £99
RISC OS Companion Vol 1	*Oak*	V0 £49
RISC OS Style Guide	*Acorn*	V0 £13
RoboLogo	*Silicon*	£38
Round the World Yacht Race, age 9+	*Storm*	£25
Saloon Cars Deluxe	*Fourth Dim*	£25
Deluxe Extra Courses	*Fourth Dim*	**£14**
S-Base Developer	*Longman*	**£140**
S-Base Developer Plus	*Longman*	£255
S-Base Network	*Longman*	£275
S-Base Personal	*Longman*	**£70**
Schema	*Clares*	£95
Schema 2	*Clares*	£POA
Science, drawfiles	*Micro Studio*	£25
Score Draw	*Clares*	£44
Scorewriter PMS Desktop, age 12+	*EMR*	£147
ScreenPlay	*Widgit*	£35
ScreenTurtle version 2	*Topologika*	£45
Search and Rescue, age 9+	*Storm*	£27
Seashore Guide, drawfiles	*Micro Studio*	£16
Seelinks – Ourselves, KS1,2	*ESM*	£27
Seelinks – Pond Watch, KS2	*ESM*	£35
Seelinks – Tourism, KS3	*ESM*	£55
Seelinks – Transport, KS2	*ESM*	£35
Serenade	*Clares*	£106
Serpents	*CIS*	£POA
Settlement, KS3	*ESM*	£31
ShapeFX	*Data Store*	£10
ShareHolder	*Silicon*	£96
ShareHolder Professional	*Silicon*	£164
ShowPage	*CC*	£143
Shylock Gnomes, age 10-15	*Selective*	£16
Sim City	*Krisalis*	£22
SkyHunter	*Longman*	£22
Sleuth	*RISC*	£42
smArt	*4mation*	£50
smArt Aliens, Animals, Dinosaurs, Egypt, Europe*, Faces*, Fantasy, Fashion, Fiddles & Drums, Heraldry, Homes*, Leisure*, Look Smart, Smartoons, Trees and Gardens *Please specify English, French, German, Spanish or Welsh – each	*4mation*	£15
smArtFiler	*4mation*	£32
smArt Modern Languages	*4mation*	£19
Smudge the Spaniel, age 4-8	*Storm*	£20
Snippet (new version)	*4mation*	£32
Soapbox	*Xavier*	£34
SolidCAD	*Silicon*	£77
SolidsRender	*Silicon*	£77
SolidTools	*Silicon*	£204
– education price		£194
SongBook, age 3-10	*EMR*	£24
Sound Engineer, age 12+	*EMR*	£59
Sound-FX Maker	*CIS*	£POA
Sound-FX Maker & Photopia	*CIS*	£POA
Sounds & Rhymes	*Xavier*	£29
Spark	*David Pilling*	£5
SparkFS	*David Pilling*	£20
Sparkle	*Morley*	£59
Special	*ICS*	£10
– site licence		£30
Speech!	*Superior*	£18
Spelling week-by-week	*Chalksoft*	£20
Spex	*ExpLAN*	£98
Spheres of Chaos	*Matt Black*	£19
Splash, age 7-11	*Sherston*	£19
Splice	*Ace*	£34
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Spoken Word	*Wyddfa*	£16
Spooler	*Computer Tutorial*	£9
Sporting Triangles	*CDS*	£19
SportsDay	*Selective*	£20
SportsPeople	*Selective*	£20
SpriteEd	*Computer Tutorial*	£17
SpySnatcher	*Topologika*	£12
Square Route	*Computer Eyes*	£16
Squirrel	*Digital Services*	£120
Starspell Plus	*Fisher-Marriott*	£19
StartWrite	*Icon*	£55
StockPack	*Topologika*	£37
StoryBook, age 3-10	*EMR*	£59
StrongED	*Stallion*	£22
Studio24Plus Version 2, age 11+	*EMR*	£149
Studio24Plus Version 3, age 12+	*EMR*	£210
Stunt Racer	*Fourth*	£25
SUMthing	*Resource*	£19
SuperDump	*Silicon*	£20
Superior Golf	*Superior*	£14
SuperPlot	*Silicon*	£20
Swiv	*Krisalis*	£19
TABS	*ExpLAN*	£95
Talisman	*Minerva*	£8
Talking Pendown	*Longman*	£54
Talking Pictures	*Wyddfa*	£16
Target Maths	*Triple R*	£15
Technodream (Nevryon 2)	*Superior*	£19
TechWriter	*Icon*	£159
Thinklink	*Xavier*	£29
ThinkSheet	*Fisher-Marriott*	£38
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– Britain Since the 1930s, KS2		£30
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– Making of the United Kingdom,KS3		£36
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– The Victorians, KS2		£30
TinyDraw/TinyPuzzle	*Topologika*	£34
TinyPuzzle	*Topologika*	£24
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Tools Graphics, drawfiles	*Micro Studio*	£23
Topographer	*Clares*	£61
Touch Type	*Iota*	£38
Tower of Babel	*Cygnus*	£17
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Tracer	*Midnight*	£46
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Transport, drawfiles	*Micro Studio*	£25
Turbo Type	*CIS*	£POA
Turbo Type, Sound-FX Maker, E-Numix	*CIS*	£POA
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Twin World	*UBI Soft*	£14
TWO (Task and Window Organiser)	*ICS*	£10
– site licence		£30
TypeStudio	*RISC*	£38
Utility Disc 1	*Data Store*	£8
Utility Disc 2	*Data Store*	£13
Utility Disc 3	*Data Store*	£7
Utility Collection	*Data Store*	£21
Vector	*4mation*	£75
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– Arc/Mac Cable	*Human*	£24
Viewpoints, age 7-11	*Sherston*	£37
Virtual Golf	*Fourth Dim*	£25
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Vox Box	*Clares*	£44
Waiter	*Digital Services*	£35
Waterloo (not OS 3.1)	*Turcan*	£19
Whale Facts	*Topologika*	£31
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Words and Pictures	*Chalksoft*	£18
WordWorks	*CC*	£38
Wordz	*Colton*	£85
World Geography Maps, draw	*Micro Studio*	£23
WorldMaker, KS3,4	*ESM*	£51
World Map Study, KS3,4	*ESM*	£61
Worldscape	*Leading Edge*	£17
World Wildlife, sprites	*Micro Studio*	£16
Worra Battle	*Oak*	£15
WorraCAD	*Oak*	£79
Yacht 2	*Computer Tutorial*	£49
Yacht 7	*Computer Tutorial*	£94
Zarch	*Superior*	£14
Zelanites (not OS 3)	*Micro Power*	£15
Zool	*Gremlin*	£19

For ordering details please turn to page 3

ICS

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HARDWARE

I²C PRODUCTS . . .

AnDi Oddule	*Baildon*	£39
I²C Adaptor (needed unless you already have an I²C socket)	*Baildon*	£10
I²C SWI (enhanced IIC_Control)	*Baildon*	£15
– bought with Oddule		£5

SCANNERS, DIGITISERS . . .

ArcScanner including Epson GT-4000	*Clares*	£1660
Colour Converter	*Lindis*	£145
FaxScan	*Spacetech*	£94
GreyHawk	*Wild Visiion*	£98
Handipad	*TechSoft*	£193
Hawk V9 MkII	*Wild Vision*	
– standard		£199
– hardware dithered		£259
HiVision Digitiser Colour	*HCCS*	
– A3000 External		£137
– A3000 Series / A4000 Internal		£124
– A5000 / 300 / 400		£124
iMage (Sharp JX-100)	*Irlam*	
– for A5000		£490
– for other computers		£589
Image Scanner	*Iota*	£383
– Colour Upgrade Kit	*Iota*	£239
– Fast Parallel Card	*Iota*	£98
i-Scan 200	*Irlam*	£539
i-Scan 400	*Irlam*	£589
Pineapple Colour Video Digitiser	*Pineapple*	£195
– A3000 boxed	*Pineapple*	£230
ProImage (Epson GT6000)	*Irlam*	
– for A5000		£989
– for other computers		£1089
Scan-Light A4	*CC*	£277
Scan-Light 256	*CC*	£185
– A3000 External	*CC*	£190
– A3000 internal	*CC*	£190
Scan-Light Professional	*CC*	£565
– as above + SCSI interface	*CC*	£699
Scan-Light Video	*CC*	£208
SnapShot Colour Video Digitiser	*Lingenuity*	£195
– A3000 version	*Lingenuity*	£275
Spectra	*RISC*	
– A3000 Series / A4000 Internal		£545
– A3000 External		£555
– Archimedes / A5000		£545
Vision Digitiser	*HCCS*	
– A5000 / 300 / 400 Mono		£48
– A5000 / 300 / 400 Colour		£76
– A3000 External Mono		£60
– A3000 External Colour		£89
– A3000 Series /A4000 Internal Mono		£48
– A3000 Series / A4000 Internal Colour		£76

MEMORY . . .

Fitting extra unless otherwise stated
† Fitting fairly easy ‡ Fitting needs expertise

A3000 2 Mb Upgradable †	*Atomwide/IFEL*	£43
A3000 4 Mb †	*Atomwide/IFEL*	£100
A3010 1-2 Mb		£39
A3020 / A4000 2-4 Mb †	*IFEL*	£POA
A310 2 Mb Upgradable soldered ‡	*IFEL*	£88
– as above + MEMC1a		£113
– as above + MEMC1a + fitting		£143
A310 4 Mb soldered + MEMC1a ‡	*IFEL*	£152
– as above + fitting		£182
A5000 2-4 Mb †	*Atomwide*	£85
A5000 2-8 Mb including fitting	*Atomwide*	£500
A5000 4-8 Mb including fitting	*Atomwide*	£391
A540 4 Mb †	*Acorn*	£238

PRINTERS . . .

ArcLaser 300-6	*Calligraph*	£895
ArcServer 300-8	*Calligraph*	£985
Bubble Jet BJ-10sx	*Canon*	£187
Bubble Jet BJ-10sx + TurboDriver	*Canon/CC*	£219
Bubble Jet BJ-200	*Canon*	£282
Bubble Jet BJ-230	*Canon*	£315

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Bubble Jet BJ-300	*Canon*	£325
Bubble Jet BJ-330	*Canon*	£380
Bubble Jet BJC-800 + TurboDriver	*Canon/CC*	£1374
DeskJet 510	*Hewlett-Packard*	£275
DeskJet 500C	*Hewlett-Packard*	£375
DeskJet 550C	*Hewlett-Packard*	£525
Laser Direct HiRes4	*CC*	£899
– 250-sheet Paper Cassette		£99
Laser Direct HiRes8	*CC*	£1275
Laser Direct HiRes Board	*CC*	£325
New toner cartridge for Canon LBP-4		£59
New toner cartridge for Canon LBP-8		£75

COMPUTERS . . .

A3010 Action Pack	*Acorn*	£335
A3010 Learning Curve System	*Acorn*	£599
A3020 FD System	*Acorn*	£650
A3020 HD60 System	*Acorn*	£775
A4 2M FD System	*Acorn*	£1350
A4 4M HD60 System	*Acorn*	£1650
A4 Battery Pack	*Acorn*	£53
A4 Shoulder Bag	*Acorn*	£37
A5000 2M HD80 Multiscan System	*Acorn*	£1225
Pocket Book	*Acorn*	£210

MISCELLANEOUS. . .

386 PC Expansion Card 25 MHz	*Aleph One*	
– 1 Mb		£POA
– 4 Mb		£POA
486 PC Expansion Card	*Aleph One*	
– 1 Mb		£POA
– 4 Mb		£POA
4-slot 4-layer Backplane	*IFEL*	£52
5315 Monitor	*Aydin*	£425
A300/400 Fan kit	*ICS*	£15
A3000 Expansion Box	*Wild Vision*	£135
A310 RISC OS Carrier Board ‡	*IFEL*	£18
A5000 Fitting Kit for second hard disc	*ICS*	£15
A5000 105 Mb Removable Disc Kit		£POA
– Extra 105 Mb Disc		£POA
Arckey Function KeyStrip Holder	*ICS*	V0 £3
– pack of 4		V0 £10
ArcNET	*ACS*	£69
ARM3 ‡	*Aleph One/IFEL*	£165
Arm_Stick	*Arm_Tech*	£28
ColourBurst	*State*	£374
ColourCard	*CC*	£225
– A3000 External	*CC*	£225
Dongle Dangle with screw fittings	*ICS*	£6
Fan filters (pack of 10) (not A5000)	*ICS*	£6
FaxPack	*CC*	£289
Floating Point Accelerator (A5000 + A540)	*Acorn*	£93
Floppy Discs, 10 × 3½" High Density		£10
G16 True Colour Card	*State*	£258
G8 Plus Accelerator	*State*	£238
HiPoint Mouse for A4	*Genius*	£49
Microlin fx Pocket Fax Modem	*Pace*	£179
Micro Mouse	*Clares*	£26
Monitor Stand for A3000	*ICS*	£21
Mono/SCSI	*Atomwide*	£48
Podule Case for A3000	*HCCS*	£16
Printer Port Sampler	*Leading Edge*	£42
Printer/SCSI	*Atomwide*	£74
Publishing Pack	*CC*	£475
Revolution CD-ROM	*Morley*	£295
Revolution Pro (for SCSI system)	*Morley*	£435
RISC OS 3 Upgrade	*Acorn*	£45
– A5000	*Acorn*	£25
Seal 'n Type spill-proof Keyboard Covers		
– Archimedes / A5000	*Kador*	£14
– A3000	*Kador*	£14
TouchWindow	*Lindis*	£234
Whisper Fan Quietener (for A300/A400 series only)	*ICS*	£15
Wizzo IDE Filing System on rom	*ICS*	
– Wizzo4 for A4		£POA
– Wizzo5 for A5000		£39

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CARRIAGE IS FREE WITHIN MAINLAND UK IF YOU PAY ON ORDERING.

Overseas carriage: If you are paying by credit card we will add airmail and insurance at cost. Otherwise please add £6 (Europe) or at least £12 (elsewhere) for each software item and send a pounds sterling bank draft payable at a London clearing bank, or Eurocheques for not more than £100 each.

Credit cards are welcome. We do not charge your account until your order is fulfilled. Your name and address must be as known to the credit card company. If you are leaving an order on our answering machine please include your telephone number, the expiry date of your card, and your calculation of the total payment due. We will make no charge for credit card commission unless we have informed you first.

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LICENSED CREDIT BROKER

Temptations of the press

INTEGRITY is one of those words that suffers from abuse, usually from people who don't have any but would like others to think they do. It actually derives from a Latin word meaning *untouched* and in current English means the quality of being unimpaired or honesty.

Now let's face it, being honest all the time is hard – not just telling lies but honesty to your principles and so on. But the bigger your sphere of influence the more important integrity becomes or rather the more significant it becomes if there's a break in integrity.

One area where integrity is crucial, and far too often lacking, is in publishing. As an editor I have the power to influence the information you receive through these pages, which makes me a powerful force in the world of Acorn.

By changing a single word of, say, a review I can change the way you think about a product. The reviewer might have written something like:

...the program is very easy to install...

and all I have to do is change it to:

...the program is fairly easy to install...

and instantly the program is not as easy to install as it was seconds ago – as far as the reader is concerned.

We could get into philosophical arguments about truth but frankly truth is relative: A program that's easy to install for one person may be an insurmountable problem to someone else – after all, what does he mean by *install*?

What we're talking about is integrity. If I'm an honest person, and I hope I am, I leave the text alone so the intention of the reviewer is what appears on the page. Sometimes we have to change things, removing repetition and adding explanations, but always in line with what the original author intended.

We're not perfect and sometimes we get it wrong – then there's usually an irate author on the end of the phone. Such is the life of an editor.

But one of the problems with integrity in publishing is that it is so easy to change things. Electronic publishing has aggravated the situation a thousandfold, because now not only can words lie, but so can pictures.

A classic and public example of this occurred a while back when the English lorry driver transporting super-gun parts to Iraq was arrested in Greece. The tabloids had a field day and one of them, apparently, got him out and on the front page of the Sun was a picture of the driver descending from the plane sporting a Sun T-shirt.

On the Daily Mirror was a picture of him descending from the plane in a Daily Mirror T-shirt.

One was true the other wasn't but which was which? Or maybe they were both faked. The problem is that it is easy using electronic publishing tools to modify pictures in such a way that you cannot tell the real from the false. Nowadays the camera *can* lie.

But integrity goes further than that: Between computer magazines there is a war based around who can get the reviews of the major products into print first.

Let's suppose, for example, that a game is being converted from the Amiga to Acorn and it's supposed to be out by a given date and, as editor of a magazine, you are told it will be *identical* to the Amiga version – ah, there it is, temptation.

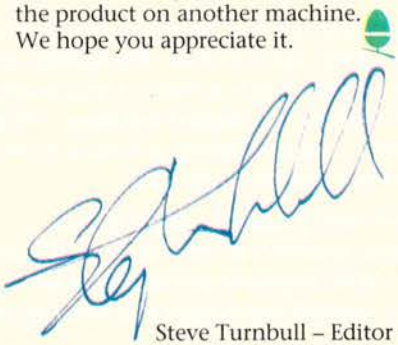
Why not review the Amiga version and throw in the screenshots you've been given of the Acorn version? It's so easy to beat the rest that way. The main problem with this approach is that programmers are notoriously over-optimistic about time needed to complete a project.

So you put in the fake review, and the program fails to appear for months afterwards. You upset the readers and the software house who might think twice about advertising with you. Very damaging all round.

Then again software houses aren't necessarily blameless, they too fall into the over-optimistic programmer trap and begin to advertise products before they're finished because the programmer promised it would be. It takes a strong will to wait until a program is genuinely complete before even booking advertising.

We at *Acorn Computing* try to be as honest as possible because we wouldn't want others to do unto us. If a product isn't finished we don't review it, or we say it's a preview and we certainly wouldn't review the product on another machine. We hope you appreciate it.

Is honesty always the best policy? Steve Turnbull tells tales about publishing lies



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Tel: 0625 878888 (All depts.) 051-357 2961 (Subs.) Fax: 0625 879966
Published by: Europress Publications Limited, Europa House, Adlington Park, Macclesfield SK10 4NP.

EUROPRESS PUBLICATIONS

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Acorn Computing welcomes new program listings and articles for publication. All material should be supplied on disk Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.
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News Trade Distribution: Comag 0895 444055

Printed in the UK by BPCC Magazines (Carlisle) Ltd

ICS WIZZO (it's magic)

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The ideA range

ICS was the first company to offer IDE products for Acorns back in 1990; now they are the standard choice for new Acorn computers. Building on three years' experience we have continually improved our IDE filing system. It now offers the highest level of RISC OS compliance, and compatibility with at least 45 different hard discs tested by us. Can any other supplier make this claim?

Our IDEFS abolishes the RISC OS limit of 512 Mb, and offers extra features such as password protection, background operation, disc partitioning, and power saving (which allows some discs to stop spinning when idle).

Partitions can have different levels of protection. Family or pupils can access some of your files while you keep others safely out of their reach. Or you can simply protect the whole disc (reformatting is not required for this).

Our hard disc upgrade kits are based around two internal interfaces at present: IDEA3IN for the A3000 Series, and IDEARCIN for the A300/A400/A500 Series. All kits are designed to a high standard and include all the parts you will need.

IDEA3IN upgrade kits include an I²C expansion socket as standard. They come with a 2½" disc already attached, and are easy to fit once you have opened up your computer. You may safely disbelieve rumours spread in the past (by sellers of SCSI hard discs) that internal upgrades might not be safe in an A3000. We have adhered carefully to the guidelines in Acorn's technical specifications, and in three years have never come across a problem.

IDEARCIN upgrade kits provide a fast 16-bit link all the way from the computer to the hard disc. They can even be fitted to an A310 without a backplane – quite a cost saving. A second hard disc can easily be added later if required.

Interfaces and hard discs can also be bought separately. By shopping around you may even save a few pounds. But beware: not all IDE hard discs work with all interfaces, and if you have a problem it may be difficult to decide who should put it right. We recommend buying a complete kit from one source.

WIZZO is the name given to our IDE filing system when it is supplied as a single rom chip. Wizzo5 is for the A5000, and Wizzo4 is for the A4. You should buy a Wizzo if you need password protection or wish to use larger hard discs. (Wizzo4 has been delayed slightly – we are adding a feature to ensure compatibility with possible future A4 upgrades).

A Wizzo rom by itself will only produce a slight speed improvement. If you need speed in an A5000, fit an IDEARCIN interface instead. Up to 60% improvement can then be achieved, but this does depend which hard disc you use so do check with us first.

How to read our ideA product references

A number at the end is the nominal hard disc capacity in megabytes. We usually round this down, so the actual formatted capacity may be higher. All discs have auto-parking. Average access times vary but all are below 20 ms.

All prices shown exclude VAT and are subject to change without notice. The cost to us for hard discs can vary enormously from week to week – not always downwards! Your local dealer can obtain *ideA* products from us or from a distributor.

Archimedes A300/A400/A500 Series Internal Upgrades

Package includes formatted hard disc, ideA interface card, hard disc cradle and fittings, fan kit, replacement multi-purpose LED (power and drive status), manual with fitting instructions. Can be fitted to an A310 without a backplane. If a backplane is used it must be a 4-layer type. Easily fitted by most users.

IDEARCIN 40	£175	IDEARCIN 330	£399
IDEARCIN 80	£205	IDEARCIN 420	£499
IDEARCIN 170	£275	IDEARCIN 540	£650
IDEARCIN 240	£325	IDEARCIN 1000	£925

A3000 Series Fully Internal Upgrades

Package includes formatted hard disc mounted on ideA interface card, manual with fitting instructions. Fully internal, using internal expansion slot. Co-exists with floppy drive and memory upgrades. Fits the new 1992 computers. Easily fitted subject to Acorn warranty stipulations.

IDEA3IN 40	£175
IDEA3IN 80	£250
IDEA3IN 120	£299
A3000 FAN KIT (not usually required*)	£19

**Only required if the computer has been fully upgraded, e.g. with maximum memory AND Econet AND an external podule.*

Separates for hard disc upgrades

We can only guarantee the performance of ideA interface cards with hard discs we have tested ourselves, so please check if in doubt. If you are buying a hard disc for an A5000 please say so. If you intend to fit the disc in addition to an existing one we need to know the make and model of the existing disc. Acorn's interface does not support all makes of disc, and some models will work as a second disc but not on their own.

Hard discs on their own are listed as, for example, IDEA 80. An S at the end indicates a 2½" disc.

IDEARCIN (Archimedes Interface for Internal disc(s))	£60
IDEA3IN (A3000 Interface for Internal disc)	£75
ARCHIMEDES INTERNAL CRADLE KIT	£15
ARCHIMEDES A300 / A400 SERIES FAN KIT	£15
4-SLOT 4-LAYER BACKPLANE	£52
POWER CABLE FOR SECOND HARD DISC	£5
A5000 SECOND HARD DISC FITTING KIT	£15

IDEA40	£125	IDEA330	£349
IDEA80	£155	IDEA420	£449
IDEA170	£225	IDEA540	£600
IDEA240	£275	IDEA1000	£875

IDEA40S	£115
IDEA80S	£190
IDEA120S	£239

WIZZO IDE Filing System on rom

Package includes rom, manual and fitting instructions. Compatible with RISC OS 3.0 and 3.1. Allows up to four logical partitions over two physical drives. Each partition appears separately on the icon bar and can have different password protection. Makes use of existing Acorn hardware for maximum compatibility, but works with a wider range of hard discs. Security breaches using ADFS can be prevented. Can be fitted easily by a competent user.

Available now: WIZZO5 for A5000	£39
Available soon: WIZZO4 for A4	POA

Quantity discounts available • Dealer enquiries welcome

ICS (Ian Copestake Limited), Dept AC14, 1 Kington road, WIRRAL, Merseyside, England, L48 5ET

Bargaining power

SOFTWARE Bargains and Mercury Games have changed their name to Vantage One Direct (0532 436300).

The reason for the change is that customers' needs have become more sophisticated and while still planning some great bargains for the future these members of the Micro Power Group decided the time was ripe for a name change.

The philosophy of this mail order company remains *keep it simple and what you see is what you pay* with all prices VAT inclusive and postage free.

If you want to know more, Vantage One Direct have put together a customer information pack.

English vs jargon

THE latest addition in Chambers English Usage range of books is *Making Sense of English in Computers* by Geoff Wilkins. Available in paperback for £5.99 from Chambers (031-557 4571) it is an easily accessible A-Z guide clearly listing and explaining terms. It covers many programming terms, electronics, games and artificial intelligence.

Move it in real time

MINERVA'S (0392 437756) animation system, PrimeMover is now available. Priced at £79.95 this is more than just a sequencer for hand drawn frames.

Minerva have produced a system which allows you to create frame sequences for simple animation but takes it further by enabling these animated sprites to be moved about on the screen while keeping the interface easy to use.

This is done using a configurable button bar which lets you create simple animations or more sophisticated ones using PrimeMover's advanced features.

Everything is done in real time which makes it easy for younger users to understand the relationship between the various elements of animation.

Furthermore you can specify actual times when events will happen. This fits in well with PrimeWord and PrimeArt.

Game for adventure

FOLLOWING the launch of Xenon 2 and a conversion of RoboCod, Simon Lovesey's GamesWare (0703 456523) have taken over the sales and marketing of Software 42 titles FRED and Cycloids.

GamesWizard and six button joy-pad called the Power pad have also been added to the range.

The latter gives all 32-bit owners control of their games via the printer port and comes complete with driver software supporting the Acorn joystick standard.

The next new title from GamesWare is likely to be Simon the Sorcerer which is a new graphical adventure game about to be released on the PC and Amiga and is on schedule for a Christmas Acorn release.

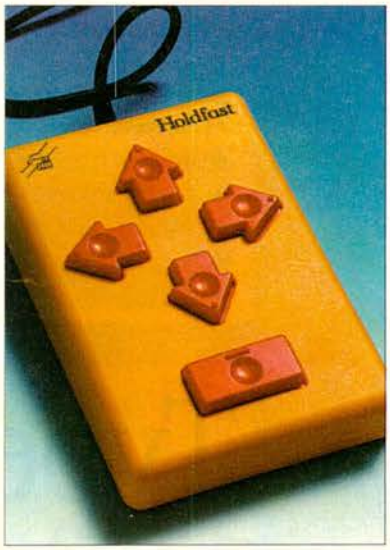
A mix of superb cartoon animation, puzzles and nursery rhyme characters should work well for both Simons.

A joy to hold

WITH younger children in mind Holdfast (0454 4111126) have developed the Joypad. Designed to be friendly to use and to take a great deal of punishment, it is aimed at nursery aged children who find keyboards, mice and joysticks too tricky.

The bright colours and chunky shape works equally as well on table or floor from simple one-button action to full mouse emulation.

The Joypad costs £24.99 and plugs into the games joystick port on the A3010 or any standard joystick adaptor for the other machines. Look out for Holdfast's own BBC joystick adaptor making its debut at Acorn World.



● *Joypad: Brightly coloured, sturdy and easy to use*

Multitasking expert shell — a first

A FIRST for the Acorn market is the release of Observess, an expert system shell for RISC OS machines and for £20 you get a development and run-time version. It runs on the desktop and is totally multitasking with the ability to have up to 100 initial facts which can be either positive or negative.

Unusually for this type of package, the run-time version can be distributed with self developed knowledge bases without having to pay royalties.

Observess supports percentage-based certainty factors on initial facts and whole rules. Only one goal is permitted at any one time. There is also the ability to save background information with the knowledge base.

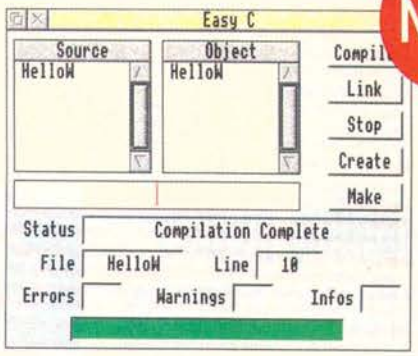
You can choose to receive up to three recommendations which are placed in order of certainty. The package comes with sample bases including one on choosing an Acorn computer.

A demonstration disk is available for £2 from Rebecca Shalfield, 51 Swallowfield Road, Charlton, London SE7 7NT.

showcase software

NEW

Easy C



Easy C is a full development system designed for programmers wishing to learn or develop their skills in C.

Easy C uses a WIMP front-end to drive the compiler and linker, so no complicated command-line sequences need to be learnt. C programs may be compiled, linked and run using one single mouse click. It is ideal for beginners, but the full specification ANSI compiler (not validated) allows it to handle very substantial programs.

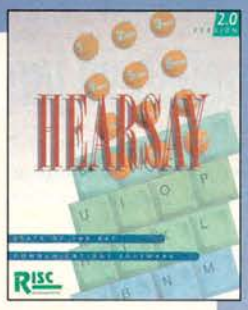
For more advanced programmers, Easy C contains an integrated Make facility and ARM assembler.

Easy C is supplied with a comprehensive user guide including a C language tutorial for beginners and a full description of all ANSI and RISC OS library functions provided.

- Easy-to-use WIMP front-end
- ANSI C compiler generates fast ARM code
- Object code linker for linking programs
- Automatic generation of Make files
- Supports all standard ANSI functions
- Library of basic RISC OS functions
- Integrated ARM assembler
- Facility to create and maintain libraries
- Integrates with editors using 'Throwback'
- FreeWare WIMP library DeskLib supplied

● ***Easy C £49***

Hearsay



Hearsay II is the most powerful general purpose communications package available on Acorn systems.

This superb package is packed with powerful features, yet remains both easy-to-learn and intuitive to use. Now the latest version has been further enhanced with an improved user interface and 3D-style dialogue boxes throughout.

- VT320, VT102, VT52 and ANSI
- Campus 2000, Viewdata, Minitel
- Tektronix 4107 graphics
- Supports RISC OS printer drivers
- Call logging
- Xmodem, Ymodem, Zmodem, Kermit
- Background file transfers
- Powerful script language
- Number directory with auto logon
- Macro processor & definable keyboard

● ***Hearsay £75***

Upgrade from Hearsay version 1, price £35.

TypeStudio

TypeStudio is the complete text manipulation package, ideal for producing high quality adverts, posters, logos, etc.

Text can be made to flow along lines and curves, or moulded inside shapes. A wide range of special effects give almost limitless design possibilities.

- Flow text along paths
- Mould Draw files to shapes
- Wall, floor, graduated shadows
- 3-D, mirror, slant & plinth
- Save in TypeStudio/Draw file format
- Supports RISC OS printer drivers
- Copy, rotate and magnify
- Import Draw files for moulds

● ***TypeStudio £45***

Supplied with 7 fonts and user guide with worked examples.

RISC developments

RISC Developments Limited

117 Hatfield Road, St. Albans, Herts AL1 4JS Tel. (0727) 840303 Fax. (0727) 860263

Please add £2.70 carriage (£1.70 for TypeStudio) and VAT to prices. Please phone for site licence & educational prices.

The final frontier

WHAT is the best way to teach children about space? Alpine Software (0762 342510) would recommend you try Explorer which was written by a science teacher using a colourful and exciting arcade game approach.

In the first part of the program you take the role of an explorer from another star who must guide a space craft through a planetary system around a rather average star – our own solar system. As he encounters each planet he must launch a probe to gather information on that planet.

The probe gives you data on relative distances, mass and gravity plus a code number so you can access more detailed information. Explorer consists of a detailed database and digitised photographs and the textual information can be used by teachers to create their own worksheets. Explorer costs £30.

Portable extras

LIQUID Silicon (0592 260512) have launched a couple of keyboards for A4 owners. These full keyboards plug directly into the A4 and you can choose between a membrane version for £39.95 or a tactile one for £40.95 (prices include VAT).

Also available from Liquid Silicon are *keyboard gloves* which are moulded to fit your keyboard protecting it from spills, food and dust for £26.95 inclusively.

On the software side they are developing a program called !BarCoder which produced drawfiles of various forms of barcodes. It currently supports the output of Telepen and binary formats as well as EAN13 product codes.

Also under development is !Slinker which lets two RISC OS machines transfer files and applications with ease via a serial link. Interestingly a parallel port option is planned for the future.

Sent to Coventry

MICROBITS (0203 367283) are newly appointed Acorn dealers for the Coventry area. These High Street retailers are the first of a number of new consumer dealers who Acorn want to launch the new consumer range.

Digital developments

DIGITAL Services (0705 210600) have now completed work on the new version of their relational SQL database Squirrel2. It has 38 separate enhancements over the previous releases including data compression, the ability to store sprites, drawfiles and text on the backdrop, spreadsheet format editing and subset updating. They have also added a new graphing module. Existing users may upgrade for £25 or £35 including a revised manual.

Also under development has been Armlock, a hard disk security system for RISC OS machines. It's a software only utility to prevent unauthorised access to CMOS ram or designated files/directories. The CMOS settings are protected by password so that only the system manager can make amendments.

The hard disk is password protected, although unlike other security systems, it does not have to be partitioned into read-only and writable areas. File attributes are utilised to grant or revoke access to files or directories for public users.

In addition there is a facility to back-up the protected areas in a compressed form to a series of floppy disks, for instance, allowing identical Armlock hard disk configurations to be created on other machines. Armlock costs £35 or £135 for a 10-user licence pack.

Digital Services are also the latest company to announce an Ethernet expansion card for Acorn machines – included in rom is Netgain for Ethernet client software. This gives you fast application loading when used in conjunction with the Netgain server pack. You can fit the card to an A3000, A3020 or A4000 and it is priced at £139.

● *Make the most of the new features in Squirrel 2*

Pocket Book promotion extended

ACORN have extended their Pocket Book and Schedule promotions until December 31. Normally priced at £212 the Pocket Book is available at £170 and on the software side personal organiser Schedule will stay at £16.98 until the end of the year.

Class Pack rates will also be reduced so that a Pocket Book Class Pack of 11 machines, A-link and mains adaptor will cost £1,699 while the Schedule Class Pack of 11 SSD roms will be £169.75.

Low risk for High Risc

LADDERS and levels are a classic format for a game and new software house High Risc Development have chosen it as their first for the 32-bit machines. Priced at £15, KV is the story of a caveman whose job in life is to collect eggs.

In essence it's a reasonably harmless occupation a little complicated by the fact that these same eggs are guarded by a host of cute but evil dragons. If you find the 100 levels over too soon a designer lets you create puzzles for yourself.

It's fully joystick compatible and the music has been specially commissioned. For further details contact High Risc Developments, 51 Mostyn Avenue,

● *Cute graphics and a classic game format*

● *Design your own levels using the multitasking designer option*

● *Scanned images of the famous for you to use – Guy and Arnie*

Clip art from the pros

THREE artists have been commissioned by Lynsoft (0287 624843) to create new libraries of clip art for RISC OS machines. The artwork has been scanned and the monochrome sprites have been compressed as Mode 15 colour sprites.

Each volume costs £7.99 with a sample disk containing sprites for each volume for £4.99.

The Macabre Art of Kerry Earl comes in three volumes featuring horror, science fiction and dynamic borders as well as a variety of half screen story illustrations.

Russel Morgan is known for his science fiction and fantasy illustrations and he has compiled two volumes of drawings. Finally the Graphic Art of Roger Morgan is available in one volume.

More volumes are expected from these artists with the work of others becoming available in the next few months. Each disk hosts at least 30 compressed sprites.

Printer in your pocket

IF YOU want a really light portable printer take a look at the Joyriter from Fujitsu (081-573 4444). This new thermal-transfer model is the same shape and size as a 1in thick A4 book.

When in operation the printer is folded and placed on one edge giving it a very small footprint – less than a quarter of an A4 sheet.

It is also able to print on plain paper from 3.54 to 8.5in with an optional 20 page cut sheet feeder. The Joyriter retails for £319 and can be powered by mains or battery.

● *Joyriter: Small is beautiful*

Games aid musical keyboard skills

THE Sound Track Keyboard Trainer from Minerva (0392 437756) is a new method of learning to use the electronic keyboard using games and pre-recorded accompaniments – all for £79.95.

Nine games including three exciting shoot-'em-ups are designed to develop your keyboard skills and note recognition.

The packages breaks down into over 60 stages lessons with more than 20 graded tunes – all with accompaniments – in many different styles including classical, traditional and many specially composed rock/pop style songs.

The development team was led by a music teacher who sees Keyboard Trainer being relevant for both the beginner and advanced student. The program is well suited to a classroom and meets the National Curriculum relating to music.

However, little supervision is needed and so is suitable for home too – all you need is a 1Mb 32-bit machine and a Midi interface.

Pocket hardware

SYQUEST removable hard drives are now available from Norwich Computer Services (0603 766592) providing a secure and portable solution. The A5000 IDE 105Mb version costs £399 and an SCSI model is available in internal or external versions and is even faster that the A5000's own 160Mb drive.

Predicting the future

PENFRIEND is a new product from Design Concept (031-668 2000) and is a predictive typer whose job it is to let people with movement or other difficulties write on a computer more easily. Its main feature is word completion letting you type a whole word by pressing the first couple of letters and then selecting the word from a list with a further key press.

In addition PenFriend is able to expand abbreviations, predict the next word and add spaces and punctuation as necessary. It comes with a sticky key function latching Shift and Control keys to allow control with one finger. PenFriend costs just £25.

Bells and whistles

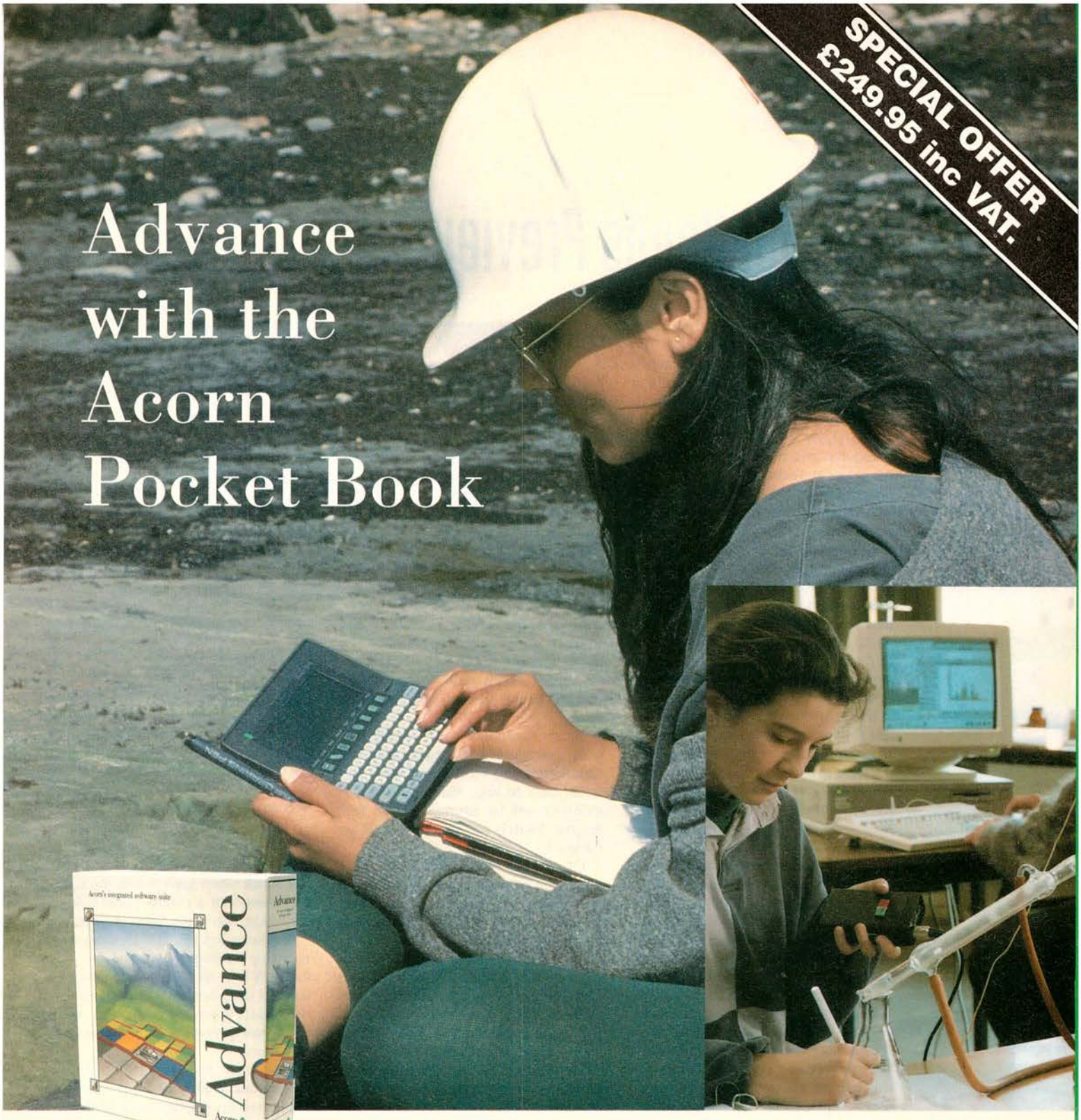
IF YOU have used Wordz from Colton Software (0223 311881) you may be aware that this is part of a wider picture – the Fireworkz suite.

The latest addition is Resultz which is a spreadsheet giving you full page-based layout of data at all times, and easy to use button bar, fast recalculation which is done in the background so you don't lose access to your spreadsheet.

In addition you can integrate live charts which can then be edited in the document.

Headers and footers can be added to each document and drawfiles can be placed in a spreadsheet and viewed on screen. Resultz includes individual control of cell backgrounds and grids and, as expected, there is file compatibility with Wordz and future members of the Fireworkz family, all for £119.

However, if you use both PipeDream and Wordz there is a special price of £95.83 and if you buy both Wordz and Resultz before October 15 you'll be entitled to a free copy of Fireworkz.



Extend the range and capability of your Archimedes computer without stretching your pocket. Save more than £200 on this special offer which includes:

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Advance and the A-Link require RISC OS 3 (Version 3.10 or later)

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Acorn

Offer valid for orders received between October 1st and 31st December 1993.
Please allow 28 days for delivery.

Special Needs Preview

THIS year will see the sixth national Micros for Special Needs Exhibition. This specialist exhibition and conference brings manufacturers of hardware and software into contact with parents, teachers and children with special needs.

The show is sponsored by Acorn Computers and the National Council for Educational Technology (NCET) who have this year organised seminars including sensing and datalogging for learners with special educational needs, using symbols with adults, developing cross curricular work, use of IT for special needs in the USA and visual impairment.

Software on display will include products from Brilliant Computing (0274 497617). **Smart Alex** can pull a number of faces encouraging children to talk about feelings, emotions and expressions.

In a command mode actions are selected for Alex from a number of verbs or Rebus symbols for non-readers.

There is also a conversation mode where Alex can reveal information about himself – though the sex and appearance of Alex can be changed at will – as well as ask questions.

Alex can be programmed with different opinions and relate these to expressions or in different languages. Smart Alex costs £25 and is available for RISC OS machines, as is **Look and Listen**, a collection of five programs designed to help children develop road safety skills and to be fun to play.

The suite of programs was developed bearing in mind that a fundamental requirement is an awareness of sound, which direction it is coming from and if this is from an incoming or outgoing source. For this reason the games use high quality stereo sound to develop discrimination and awareness.

Microworlds provides two situations which can be manipulated in various ways. In the garden, the bird flies, the dog walks, the flowers are watered and the sun goes in and out. Inside the house, the woman can be told to do various things. This is useful as a tool to get children to talk to each other or to an adult.

● *The Mouser for complete rodent control*

Finally **Facepaint** is an *identikit* program which uses a Chatback utility and Oak Recorder to record your voice and speak back to you. Also very much in evidence will be SoundStuff, All Year Round, Switch on Zoo and Spot on Games 2.

Of course, NW Semerc (061-627 4469) will be using the event to launch some new products of their own. **Phase à la Français** – the French version of Phases 3 – is designed to immerse Key Stage 3 pupils in French while developing their IT capabilities. All the elements of the English version are present as well as the ability to use French accents. All the menus, messages and wordbanks are in French. The cost is £24.

NW Semerc have also developed the **Mouser**. The idea is to allow you to disable any combination of the three buttons found on the standard Acorn mouse. This is especially useful for younger children and those with a physical handicap as it puts an end to menus popping up when not wanted.

The Mouser costs £47, plugs into the mouse socket and the mouse the plugs into this. The three buttons and three LEDs on the Mouser correspond with the Adjust, Menu and Select buttons on the standard mouse – the LEDs show which buttons are live.

Three jack sockets enable each of the mouse buttons to be operated by simple on/off switches. When a switch is fitted to both left and right jacks you can use the entire range of switch software without the need to buy a switch interface box.

If you don't like mice take a look at the **Roller** which is a mouse substitute ideal for people with poor motor control. A stationary box houses a trackerball which when spun moves the cursor on screen with a control panel holding the Adjust, Menu and Select buttons.

Bonjour mes amis
Salut! Je m'appelle Sophie. J'ai douze ans. Je suis né à Paris mais maintenant j'habite à Nimes en France.
Je parle Français et peu d'Anglais.
Je cherche une correspondante de 12 à 14 ans.
J'aime la télé, les films comiques, le sport et les animaux.
Et toi ....?

● *Enter the French phase*

The Roller lets you activate drag operations by holding down the Select button until it beeps. The ball can then be used to drag options across the screen until Select is pressed again. This makes the whole process a simple one-hand operation.

Also from NW Semerc comes an **Extendable Trolley** which is a versatile computer workstation with a desktop which can be extended from 650mm to 850mm. An integral 4-way power connector is housed in the trolley too.

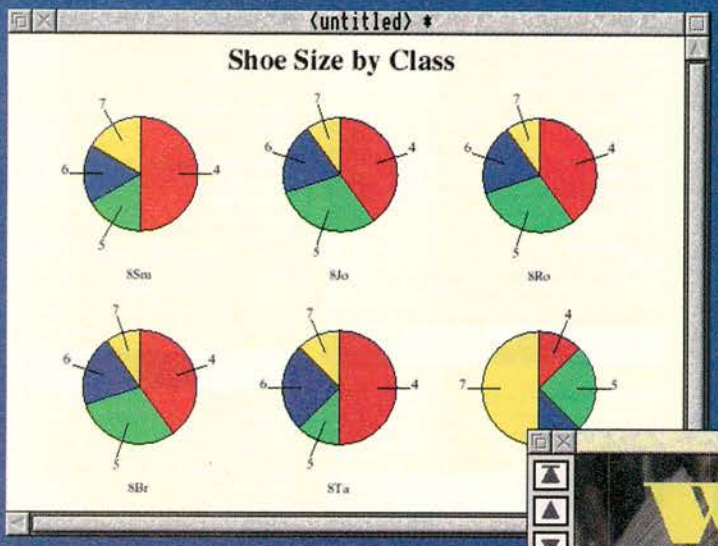
ERIC (0903 872400) are a fast growing education software company and they will be exhibiting at Oldham for the first time. Their latest product is **BearWords**, a DTP package for 5 to 13-year-olds which supports the Touch Screen and Concept Keyboard.

The program contains three separate wordprocessors from Elementary – with large on-screen icons – to Intermediate and Advanced with features usually only found in DTP packages.

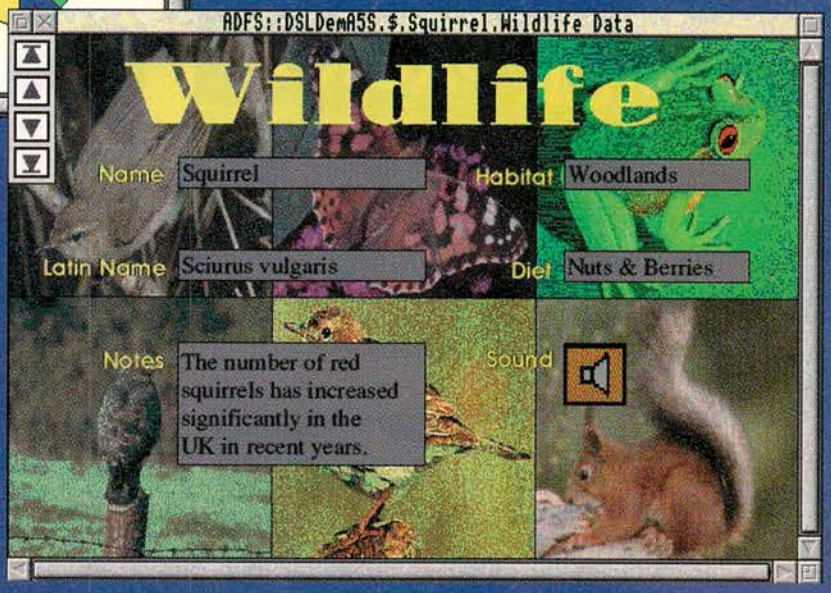
The package is designed to grow as the child's skill increases. Ready-made sample pages are available as a starting point and your own borders and designs can be added as required. All this for £36.50.

● *Special Needs – enabling all*

'the best' gets better... Squirrel 2



***Squirrel 2** incorporates 39 separate enhancements which substantially increase Squirrel's power and flexibility.*
This major upgrade makes the definitive RISC OS database even better.



New features include:

- *Data compression*
- *Faster queries*
- *Graphics and text on table backdrops*
- *Default field entries*
- *3D New look*
- *Improved validation*
- *Video buttons*
- *Automatic word wrap in multi line text fields*
- *Data may be displayed and edited in either card or list modes.*
- *Password protection to provide read only fields, and hidden fields.*
- *Integrated graphing facility*
- *Vast new range of mathematical functions*

Squirrel Single User	£ 139.00 + VAT
Squirrel multi user/Site Licence	£ 556.00 + VAT
Squirrel 'C' Developer's Toolkit	£ 99.00 + VAT
Postage & Packing	£ 5.00 + VAT

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The Learning Curve System can be purchased with the A3010, A4000 or A5000 range of computers. It consists of an audio instruction tape and software including,- Acorn Advance, PC emulator, Rhapsody 2, Scoredraw, Voxbox, Servour, Darryl the Dragon, Topography, Smart, The Crystal Rainforest, Naughty Stories and Arcventure.

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One, two, three . . .

Rog Frost explores the latest aids to maths learning for Key Stage 2

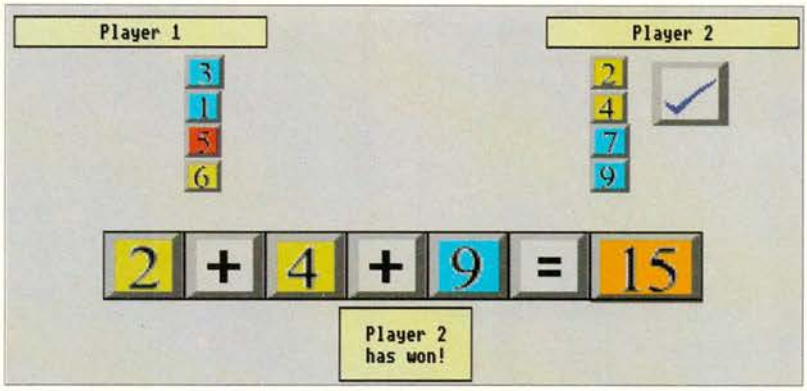
THESE new maths programs are aimed at the primary sector of education. All present different approaches to practising at least some of the four rules of addition, subtraction, multiplication and division.

Perhaps the simplest of the three is **The Numbers Game**. At the start, you're presented with nine digits and must collect from them three numbers which add up to 15. This would be very easy, but an opponent, either human or computer, is trying to do the same thing and trying to stop you from completing the task. The game is repeated and the number of repeats and the skill level of a computer opponent can be selected easily.

The program could be improved here. It does not make it clear whose turn it is to take a number. Neither does it tell you that it swaps the starting player on each game. This is a minor point but it causes youngsters definite irritation.

At the end of the game, you are invited to find all the ways of making three digits add up to 15 – there are eight of them. The program then announces how many times each digit can be used before moving on to a magic square.

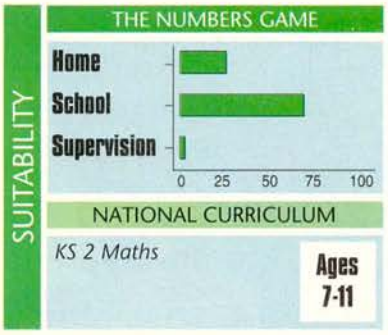
If pupils have understood the lesson so far, they'll know that the number that can be used in four different sums to make 15 must go in the centre of the square. Those that can only be used in three different ways must go in corners and the other numbers which can only be part of two different methods must go at the centre of each side. Armed with this information it is very easy to complete the magic square.

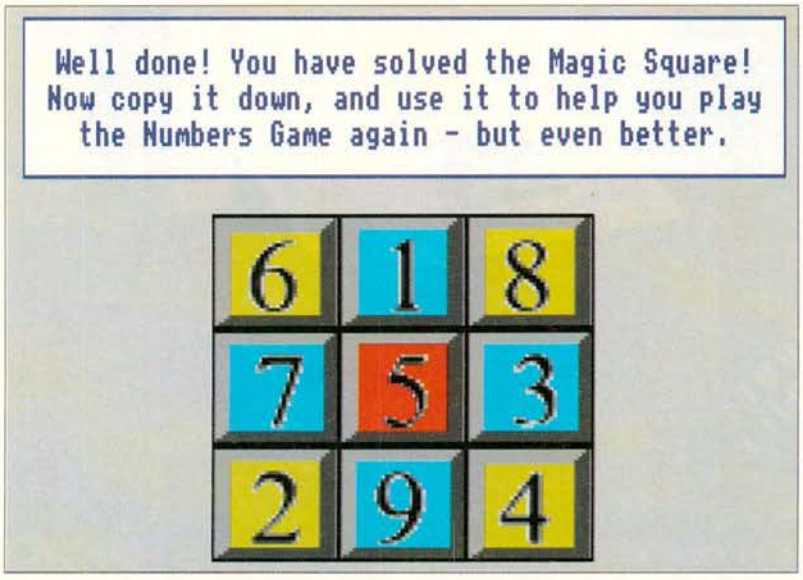


● *The Numbers Game from PES. Who can collect three digits which add up to 15?*

Then it's back to the digit-picking game. The producers have guessed that youngsters will see the link between this and the magic square and will now pick wisely. In use, I have found that able mathematicians do, indeed, improve the quality of play.

Finally, the program becomes a game of noughts and crosses. The




Well done! You have solved the Magic Square!
Now copy it down, and use it to help you play the Numbers Game again - but even better.
6 1 8
7 5 3
2 9 4

● *The completed magic square. It's easy once you've learned how with The Numbers Game*

PRODUCT SPOTLIGHT

Product: The Numbers Game
Price: £14.50
Supplier: PES, 72 Kimberley Road, Leicester LE2 1LF.
Tel: 0533 733063
Product: Amazing Maths
Price: £19.95
Supplier: CSH, The Computer Centre, 8 Bramley Road, St Ives, Cambridgeshire PE17 4WS.
Tel: 0480 467945
Product: Sumthing
Price: £19.95
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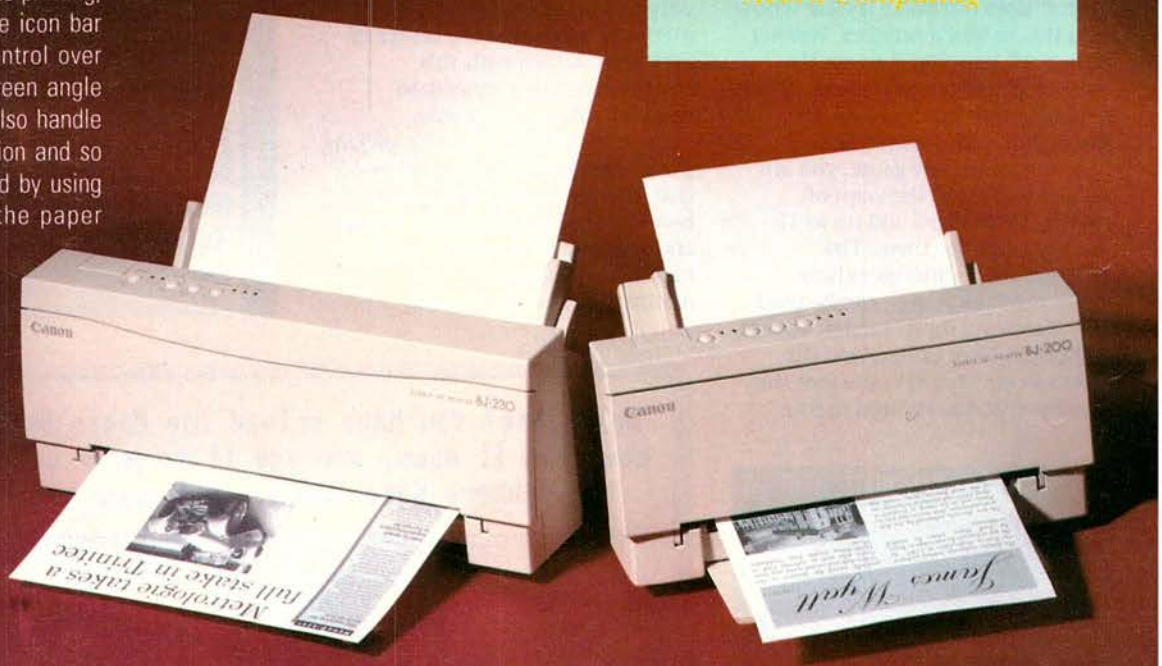
" The TurboDriver excels at its task of providing quick, high quality output.."
".. In my opinion it is well worth the money and will more than pay for itself in terms of better productivity."
Acorn Computing



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opponent can still be human or the computer – whose skill can be set. A farewell message returns the computer to the desktop.

I took an immediate liking to **Amazing Maths** perhaps because I once wrote a very similar program myself for use on my trusty old Electron. It probably goes without saying that the CSH version has vastly superior graphics and sound than was ever obtainable on the old 8-bit micros.

The basic idea is that you steer a character around a maze divided up by walls and doors. The doors can be opened by solving a numerical computation. The numbers used can be set to be anything between 1 and 20 and the type of question can use any or all of the four rules. If division questions are included, it is the answers that fall in the set range and all answers will be whole numbers.

Somewhere hidden within the maze is a demon. Step on to his square and five questions need to be answered before any further movement is possible. As if this was not difficult enough there is a time limit and quiz-style count down music to engender panic, though the time limit can be changed.

Also available is an eye. If you hold this you can immediately see the demon and plan routes to avoid him. There is also a jet pack which allows you to get through otherwise impenetrable walls and a crystal for an extra life.

The ultimate destination is the staircase which leads to another, similar maze. The number of mazes can be limited so that youngsters are not put off by the complexity of the later ones.

And that is just about it – except for the options to use Concept Keyboard or touchscreen instead of the standard keyboard or mouse, not forgetting the ability to save positions on unfinished games and the even more useful ability to keep a text record of all games played so that problems and strengths can be identified.

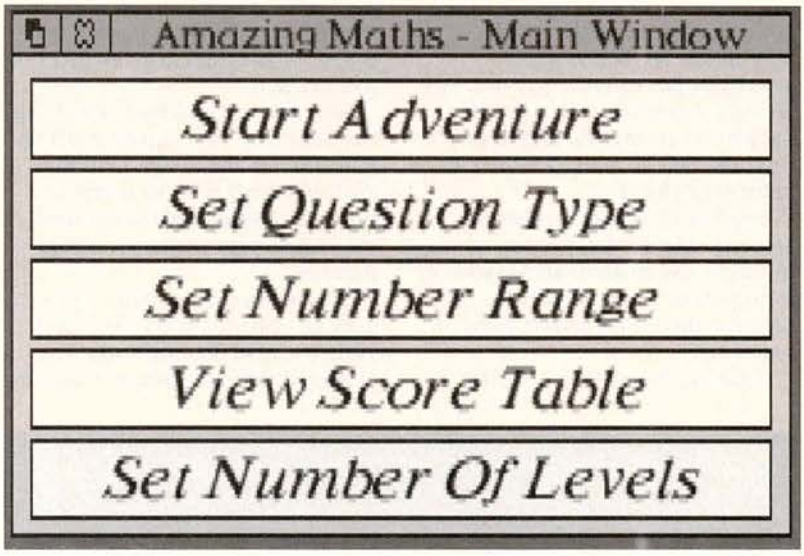
And no game like this would be complete without a high score table. This one is kept permanently but a utility on the disk allows it to be wiped clean – perhaps the best thing to happen with a new class or group.

There is one irritating feature. When you lose your last life the program ends – instantly. There is no chance to see what silly error you made. Youngsters, I have to say, don't seem worried by this, but it annoyed me.

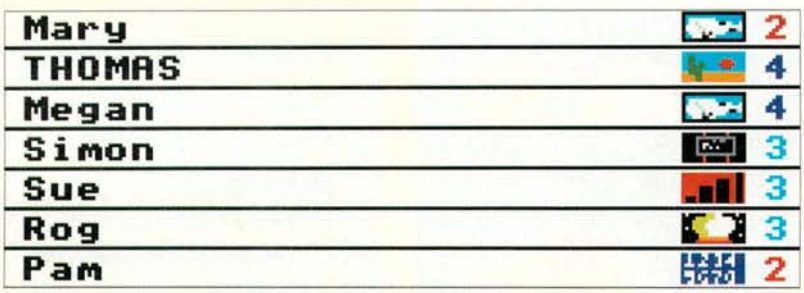
The third of these programs is **Sumthing** from Resource, another company from whom we all expect tip-top quality. This pack is more than one program and covers a variety of essential skills concerned with number work at National Curriculum levels 2, 3 and 4.

The opening screen consists of a menu, naming the programs and allowing selection. If the program were used at home this would be the way into it, but for classroom

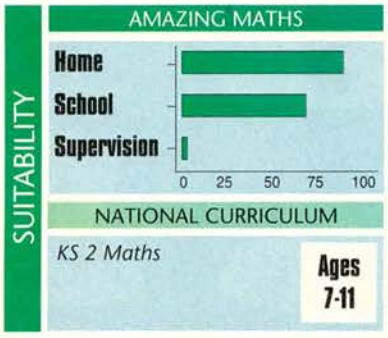
● *Amazing Maths from CSH. Lively sound effects go with neat and tidy graphics*

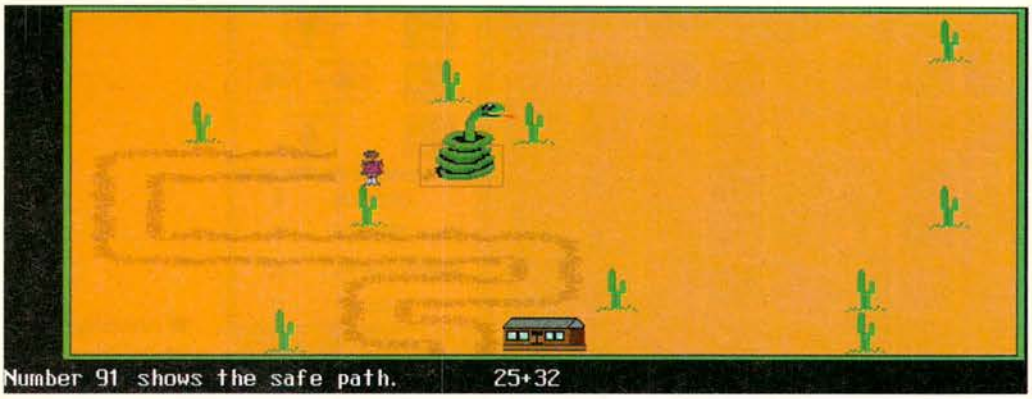


● *Amazing Maths has many options which can be set by teacher or youngsters*



● *The teacher page from Sumthing showing the different games and levels set up for a few pupils*





● *Oh dear! I've made a mistake playing The Gold Rush, part of Sumthing, and have trodden on a snake*

use, there is a hidden option which allows teachers to enter names, appropriate levels and which activity pupils should carry out. You are now presented with a list of names and youngsters can select their own for an activity which is tailor made for them.

The first challenge is called Sentence Maker. A collection of numbers and mathematical symbols is displayed. Children have to organise them into correct sums or sentences.

Ordering Numbers is just that. A list of numbers is shown and they have to be selected to put them into numerical order. This activity is timed so that there is an element of competition.

Next comes Gold Rush which has two activities. First, a path must be found across the desert. Children are told which number is safe and they move a pointer around until they find a sum which gives that number.

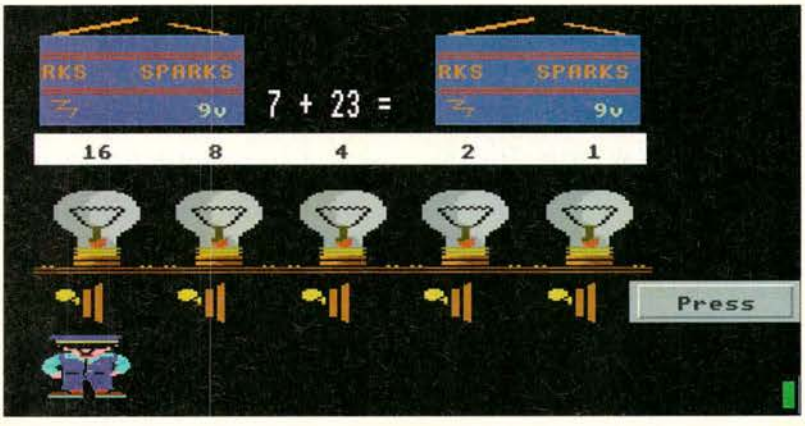
This builds a bit of path. With care, an entire path can be found. Then the gold digging starts. The process is the same but now you are looking for any even number. Selecting a sum which has an odd result will cause a snake to *get you*. This game is fun and is enjoyable.

Reading Numbers involves changing numbers such as 66 into words, sixty six. Spelling accuracy is not required since all words are obtained by use of the mouse.

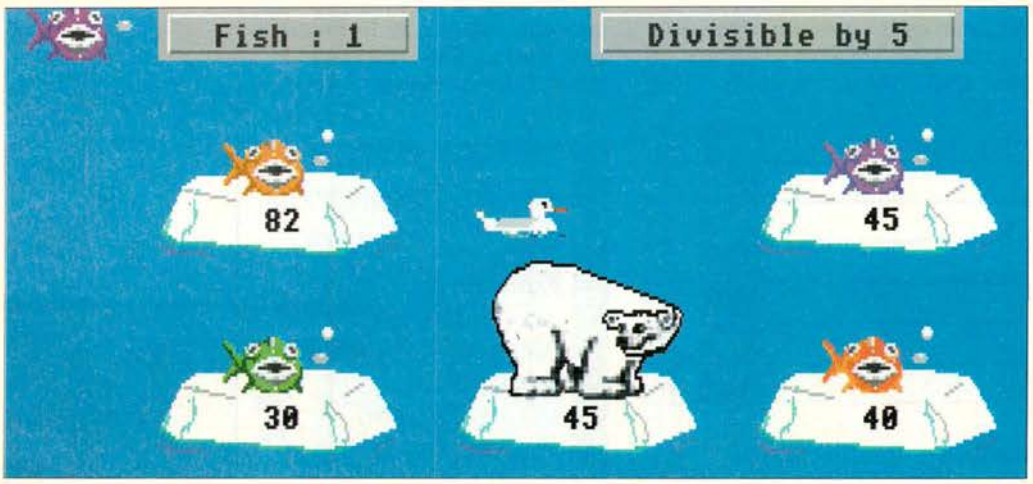
Sparks is very difficult. Resource don't mention the word *binary* but this program is about making numbers out of sixteens, eights, fours, twos and ones. This is not what makes it difficult: It is the pinpoint accuracy needed to select numbers that lets it down. Resource say it is rare for children to get a score in this game.

The final game is Divisibility where a polar bear must jump around ice flows, but only if the number on the ice can be divided by the target number. This is another graphical game and children enjoy it.

● *The beginnings of binary with Sparks, part of the Sumthing pack*



● *Divisibility, a part of Sumthing. Only ice floes divisible by 5 are safe*



Summing up

All three programs offer simple, straightforward number work practice. The Numbers Game is simple, with limited aims. Schools, with lots of potential users could find a place for this program but some of the on-screen instructions need tightening up.

Amazing Maths is good, domestic fun. I love the sampled sounds including – I think – The Beatles singing Help if you get a sum wrong. Schools would probably feel the need for a sound-proofed area to be able to run these sounds, but they can be turned off.

Good graphics and animation all make this a very worthwhile drill and practice pack – essential in these National Curriculum days. Yet again, CSH have maintained their deserved reputation for excellence.

Sumthing's collection of enjoyable and challenging programs is combined with good on-screen use of children of both sexes and of various racial origins. All in all a very worthwhile pack.

SUITABILITY

SUMTHING

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NATIONAL CURRICULUM

KS 2-4 Maths

Ages 7-16

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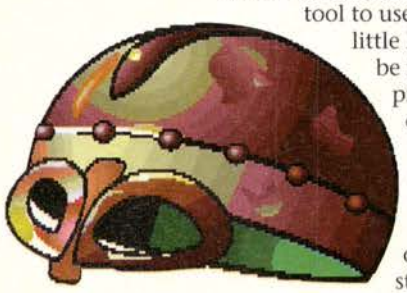
Rog Frost finds out if Sherston are still digging for victory

PRODUCT SPOTLIGHT

Product: ArcVenture III – The Vikings
Price: £31.95
Supplier: Sherston Software, Swan Barton, Sherston, Malmesbury, Wiltshire SN16 0LH.
Tel: 0666 840433

THE ArcVenture series of programs have already proved very popular in primary and secondary schools. This latest variant on the theme is based on the Vikings, and in particular the Jorvik settlement in York.

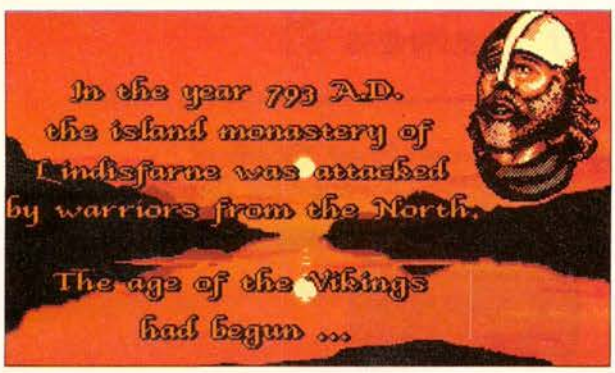
The first part of the program concerns the excavations at Jorvik. You decide where to dig and what tool to use. With skill, and a little luck, objects can be found which the program's computer can identify and carry out a reconstruction to recreate that original Viking style. Too heavy a digging style could result in breakages while using too light a tool results in time wasting and time is a precious commodity.



● *No cow horns? Helmets found at Jorvik were unadorned like this one*

To encourage correct use of tools there is a point scoring system. This has very little value and on the whole children ignore it and get pleasure from the discovery of artefacts.

From time to time an object will be found that can't be identified. This leads students to the second part of the program. They travel through a time tunnel back to Viking times to explore the streets of York. The task is to identify the object and return to modern times and the excavations.


In the year 793 A.D.
the island monastery of
Lindisfarne was attacked
by warriors from the North.
The age of the Vikings
had begun ...

● *Introducing Arcventure III, The Movie*

● *The excavation. Searching for unknown treasure*

The Viking streets of York are well populated and all the people can be approached by the adventurer and asked for information. Some of the more mercenary Vikings will only give information in exchange for another task which can mean a lot of walking to find the right people and solve all the linked puzzles.

The program can be preset to different levels resulting in different unknown artefacts being found. The level one objects have fairly straightforward solutions within the adventure while level three items have complex solutions.

This does mean that teachers can gear the program to their students and provide differentiated challenges which they can meet. Pupils who solve the challenge are rewarded with a certificate which can be printed out.

Summing up

As ever with a Sherston program the support materials are superb. On paper there are maps and information cards as well as full program instructions and lots of help for teachers or budding archaeologists – addresses and so on.

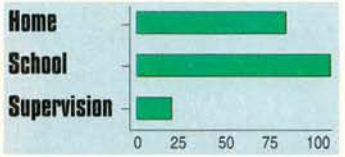
On disk is a comprehensive collection of the sprites used in the program as well as a collection of high quality draw-files. A couple of text files also give details of the objects found in the excavation.

In addition – and appearing for the first time in an Arcventure program – there is the movie. I expected an Acorn Replay film but it is not that at all.

In fact, it's not really a movie at all. Rather it is a tape slide sequence, but with simple animations added to some of the frames. Atmospheric music (tracker files) and sound effects accompany the scenes. It is a most professional job, very enjoyable and informative at the same time.

On National Curriculum terms this is a superb pack for 7 to 11-year-old youngsters. In the real world, many older children will very much enjoy the challenges it sets. Thoroughly recommended.

SUITABILITY



NATIONAL CURRICULUM

History Key Stage 2 links with Geography, Maths, Science, Technology, English, RE

Ages 7-11

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- Bert's Scrapbook - sequencing and reading skills
- Beach Sorter - sorting
- Picnic Attack - water fun game

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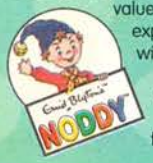

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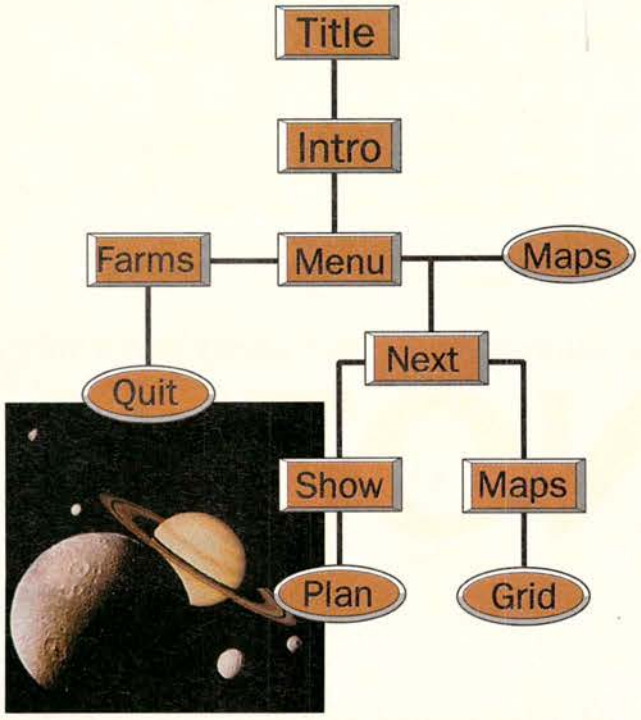

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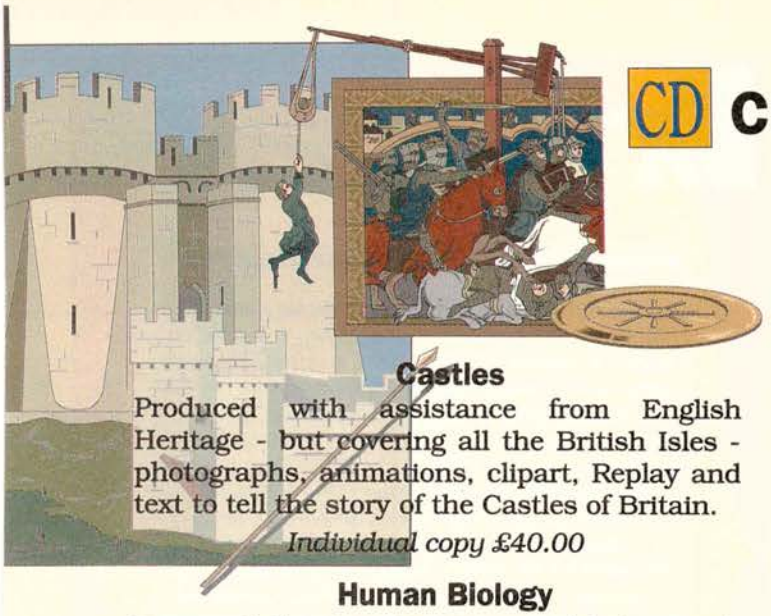

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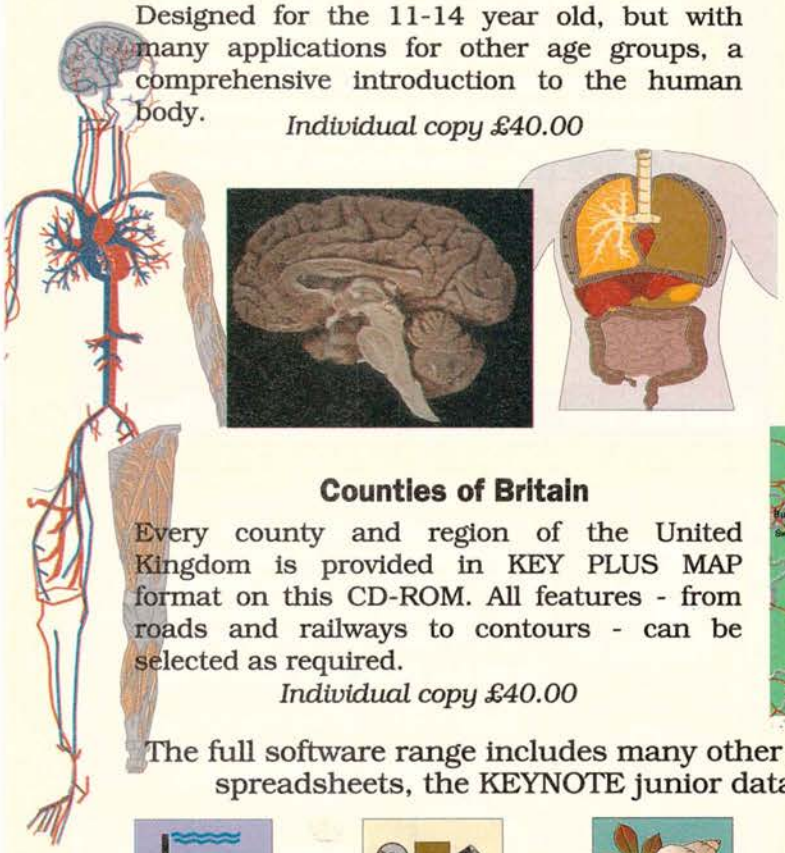

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The time of your life

Teri Paul enters the mystical, chaotic and ever-changing world of PD

IT'S the season of mellow fruitfulness but the marvellous thing about computers is that you can create your own world. So if autumn is your least favourite season, why not generate your own. How? With fractals, of course.

Fractal programs galore are available for the Arc but not to be missed is a suite by Neil Carson developed with Mike Curnow's Archimedes Fractal Group. **FracScape 2** lets you create your own fractal world and a Titler demo shows what can be achieved with a little imagination and patience.

FracScape is a large and complex program which is surprisingly easy to use. I'd recommend you to read the text files before starting, especially as they are full of interesting background information – Brown and White noise, random and non-random fractals – as well as telling you how to use the program in easy stages suitable for a novice.

Mostly random fractals are used, and Neil goes into some detail on the different types, such as midpoint displacement which is used to generate the fractal clouds. Those of you with colour cards should get better results in 32,768 (15-bit) colour mode.

The program runs from the iconbar and you start by setting the treeline, snowline and water level which are imaginary *lines* on the landscape. You can change the colours between them but remember that water level is always lower than the treeline, which is in turn lower than the snowline.

Next you adjust the lighting by opening another window, and select the direction for the light by pressing a radio button and toggle shadows and contrast on or off.

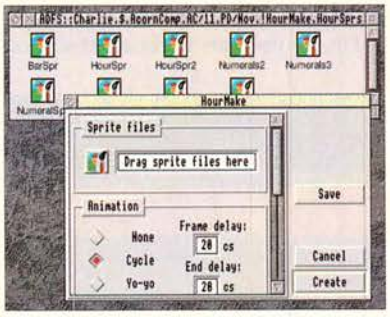
Another option to set is in the Grounds Window. Here you enter a random number which controls the shape of the overall landscape and the graininess which sets the bumps and bulges of your world.

Clicking with Shift and Select on the main icon brings up the window which makes the program *Make Ground*, though this does take about five minutes on a RISC OS 2 machine but is much quicker for those with RISC OS 3. The preview window will let you have a sneak preview of your creation and let you adjust the amount of water, light and so on.

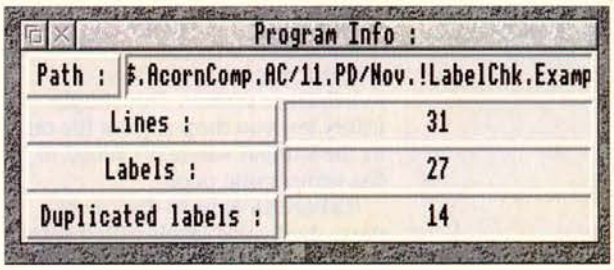
Don't forget to add an elevation in the preview mode first and click on the picture where you want to be standing and indicate the way you're facing. When everything is set to your liking the program will create a three dimensional image when you press the Project Data icon.

There is much more to this package than mentioned here and it's easy for newcomers to get to grips with while for the more experienced Acorn users it throws up some challenges for both ingenuity and imagination.

For instance you can use FracCloud to create clouds as Clear files which can then be incorporated into FracScape. For those without Translator, the utility SeeClear will be of help.



● *Enhance your hourglass with Hourmake*



● *LabelChk keeps track of those duplicated Basic labels*

Experimentation is the key and the entire set of programs is classed as shareware and for the £5 registration you'll be hard pressed to find better value for money.

Staying with fractals at a simple level take a look at **!Kwadra** which is a kaleidoscope bringing back memories of childhood and my once friend who smashed the magical creation.

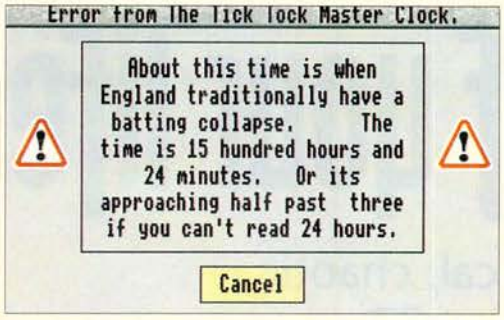
Talking of kaleidoscopes, this is the effect the **!Saviour** screen saver has. A nice program whose time delay you can alter and save and you can darken the screen if you don't want to go for the full effect. However, I don't like the way it changes my desktop font.

Micro enhancers

The wonderful thing about PD is coming across programs you never realised were needed and once booted you wonder how you ever survived. Here is a selection well worth a look at.

!Enhancers is a pleasant addition rather than a life saver and targets both RISC OS 2 and 3 users adding 3D tools to Paint and Draw whether ➤

● *Create a better world with FracScape 2*


Error from the Tick Tock Master Clock.
About this time is when England traditionally have a batting collapse. The time is 15 hundred hours and 24 minutes. Or its approaching half past three if you can't read 24 hours.
Cancel

● *Cricketing comment from the Tick Tock Clock ...*

Error from the sign of Sagittarius
It is Wednesday the twenty fourth of November in the year 1993.More about this date - Tasmania was discovered in 1642. Lee Harvey Oswald was shot by Jack Ruby in 1963. Ian Botham, b.1955.
Cancel

... as well as a spot of history and general knowledge

➤
in a directory or in rom.

!IconSprtz is useful for people constructing an application or redefining a system. This simple utility lets you drop a sprite file on to the iconbar where it's added to the wimp sprite pool.

!LabelChk aims to dispose of nasty duplicated labels which seem to pop up while programming. Just drag a Basic file to the application's icon and it'll load and check the file. An information window will present statistics on your file and the number of duplicated labels.

Now I'm not sure about this one. **!Opener** claims to be a more convenient way of opening directories than holding down Shift with Select as you just pop the directory on to the icon on the iconbar. The time taken and convenience factor is one you'll have to decide for yourself. By the way this is categorised as *soppy-ware*.

On the other hand I find **!SwapCFS** very useful. Very simply, it lets you change from an ADFS directory to its CFS equivalent and vice versa. As a module task it needs under 1.5k so is useful even on small memory machines.

Now I have a confession to make: I prefer the hourglass on the Amiga to the Acorn one, and even the ST's bee is an improvement. Ever eager to improve the look of my desktop, it was with glee that I came across **!HourMake** from Jon Ribbens.

He had previously written a program which changed the hourglass to be a nice wood-and-sand one – a great improvement. HourMake is the logical progression allowing you to vent your enthusiasm and imagination to change the animation, percentage indicator and LEDs.

The first section in the setup window deals with the sprite files. You can specify a list of these, with commas between each filename. If you drag a sprite file to the icon, it will be added to the list, unless you are pressing Shift, in which case it replaces the list. When you click Create all the sprite files will merge.

The second section deals with the animation and allows you to set up the type of animation from none to cyclical where it will continually change from first to last sprite or YoYo when it bounces from first to last sprite. The time delay between each frame of animation can be set as can the end delay.

Finally you can select what sort of percentage indicator you want – none or a bar with a percentage or numbers. It could be a little more helpful in its error messages for non-programmers but all in all it opens a host of opportunities for would-be customisers.

Amusing bits

A selection of interesting programs dropped on to the desk from Raj – aka Robin Jubber. **!Insulter** may not be frightfully useful but it made me laugh. It runs from the iconbar and when you click it comes up with such classic lines as: *You're a fun guy, but so is a mushroom.*

From the same author comes the **Tick Tock Master Clock**. As well as inhabiting the iconbar it swings its hand to give some idea of free processor time.

This is a little off putting on a RISC OS 3 machine as it moves so fast – you could always switch the cache off, of course.

Click Select on the clock and you'll be greeted with a host of messages about the time such as in summer months – at around 3.20pm you can expect an England batting collapse.

How true, but look what happened when you get a Lancashire captain. However, Adjust will bring up a totally irrelevant fact for the day including the Zodiac sign.

It's cute but I'm about to start suffering from *useless bits of information overload* as this makes the third product to give me items to bore people with at dinner time.

The trouble is is that they're quite addictive. Did you know that Roy Rogers was born on November 5, 1912 or that Topaz and fidelity are synonymous with Scorpio and you thought it was just Bonfire Night.

● *Next month I'll be looking at what is happening in the 8-bit market and covering some more innovative 32-bit shareware and PD.*

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Masterdisc, 2 Seaview, Hoylake L47 2DD.
Welsh Boys PD, 88 Queen Street, Barry, South Glamorgan CF62 7EE.

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Arcaynia, PO Box 1927, Sutton Coldfield B74 3QZ.
ArchAngel PD, PO Box 41, Exeter, Devon EX4 3EN.
Archimedes Fractal Group (AFG), 30 Bowen Drive, West Dulwich, London SE21 8PN.
ARM PD, 109 Woodland Drive, Cassiobury, Watford WD1 3DA.
ARMistic PDSL, 136 Wellesley Road, Ilford, Essex IG1 4LJ.
Craig Beech PD, 30 The Deerings, Harpenden, Herts AL5 2PE.
Datafile, 71 Anson Road, Locking, Weston-Super-Mare, Avon BS24 7DQ.
Datastream, 34 Norbreck Close, Great Sankey, Warrington, Cheshire WA5 2SX.
Different Ideas, Eyton House, Eyton, Leominster Herefordshire HR6 0AG.
Digital Illusions, 20 College Road, Wembley, Middlesex, HA9 8RL.
Digital Phenomena, 104 Manners Road, Southsea, Portsmouth, Hampshire PO4 0BG.
DigiTech, 20 Downing Crescent, Bottesford, Scunthorpe, South Humberside DN16 3LS.
Gem PD, 15 Partridge Down, Oliver's Battery, Winchester, Hampshire SO22 4HL.
HeadFirst PD, 97 Chester Road, Southport PR9 7HH.
LowCost PD, 6 Furzeland House, Sheephouse Way, New Malden, Surrey KT3 5PH.
Naked PD, Fayence, Fulford Road, Fulford, Stoke-on-Trent ST11 9QT.
Planet PD, 37 Manor Drive, Berrylands, Surbiton, Surrey KT5 8NF.
Skyfall, PO Box 2220, Birmingham B43 5RZ.
Westbourne Services, 34 Bradley Street, Wooton-under-Edge, Gloucester GL12 7AR.

This month's featured PD

Program	Library
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FracScape 2	Neil Carson/AFG
HourMake	Craig Beech
IconSprtz	Raj
Insulter	Raj
Kwadra	Raj
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The short list

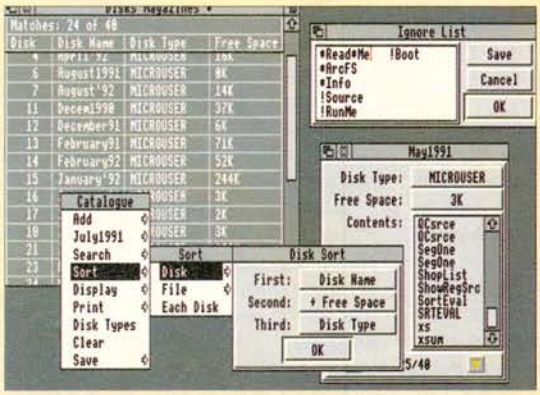
Stephen Wade and Paul Mason look at the latest batch of useful hardware and software

DiskCat: No more losing track of files

THIS program comes with a well-written eight-page manual and the application is billed as an *automatic disk cataloguing system*. Although intuitive to use, the instructions help clarify a few matters.

Using the *Preferences* option from the iconbar menu you can tailor the system setup to your needs: Level of recursion, read/ignore archives, disk and file search/display/sort characteristics, display width and printed page size.

You can set the maximum search depth, and from one of the other menu options establish an *ignore list* – filenames which are to be skipped. These essentially determine the context of a particular cataloguing operation. For example, you may want to maintain one detailed catalogue and a condensed version for quick reference.



There is also the ability to splice separate catalogue files together. No matter how much you categorise your collection, a comprehensive overview can be quickly collated. Unfortunately, if you drag a group selection of files you wish to merge to the program icon you are asked if you want to proceed for each file individually – just once for the group would suffice.

Data can be searched and ordered in a variety of ways – such as by name or disk type (game, utility and so on) – and files output in DiskCat, text or CSV formats. The second is very useful as it permits information to be imported into DTP packages and so forth.

Clicking on a disk name opens a window detailing its contents and similarly clicking on a filename opens one on to the disk from which it comes.

At times it seemed that the menu system could have been designed much better – some of the options could have been more usefully presented as dialogue boxes. It would have been more practical to enter the disk type from a menu during search configuration, considering a list is maintained of those loaded which can be viewed from the root menu.

The program serves its purpose, is much quicker and practical than manually searching through even the most comprehensively labelled disk collection and operates in an acceptable manner.

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Diss: Desktop disassembly

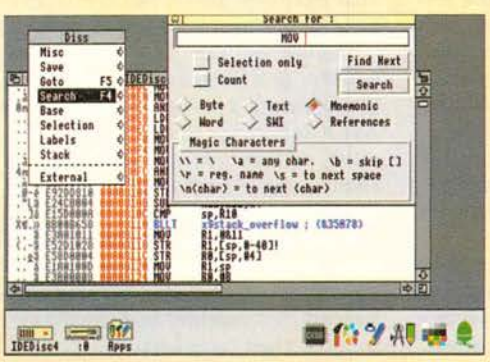
NUMEROUS disassemblers are available, some on the PD scene, others commercial. Unlike many of the others, Diss operates in the desktop and has a very good interface.

Once it's loaded, by dragging files to its iconbar icon you can instantly examine the code. The disassembly is displayed beside the hex dump and text characters – very similar to the output from using the *Memory command.

By normal dragging, it is possible to select areas of the code for global filling with words, text and mnemonics. This could be used, for instance, to fill large areas of code with no-ops.

Searching is also a strong point of Diss. Both the selection and the entire code can be searched for words, bytes, text and mnemonics.

The code, once loaded and edited as you wish, can then be saved as the same type as the original file. It can also be squeezed, using Acorn's Squeeze utility, and saved.



Diss allows you to define labels in the code and they are displayed alongside the disassembly which can also be saved separately. Finally, a text dump of the display within the window can be saved.

As well as squeezing programs when saving, Diss will automatically unsqueeze code when loading. This is tremendously useful, as after completing a program and squeezing it, it can become rather tedious when you find the need to debug it again.

For C programmers is the ability to add labels automatically – Diss will search through the code and replace references to absolute addresses with a label. For example, calls to the stack overflow function will be replaced with *BLLT x$stack_overflow*.

PRODUCT SPOTLIGHT

Price: £10
Supplier: DoggySoft, Furzefield House, Furzefield Road, Beaconsfield, Bucks HP9 1PQ.
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Compared to the other disassemblers, Diss fares surprisingly well. While it could not hope to compete with Acorn's DDT, it provides more useful features than Dissi. Against QDBug, its desktop environment definitely gives it the edge for disassembly, although it does not provide enough features for full debugging.

Overall, Diss makes a very good, value for money disassembler. If, however, you require source level debugging, it is not for you.

Basic Wimp Programming on the Acorn: Life on the iconbar

PRODUCT SPOTLIGHT

Price: £14.95
Supplier: Dabs Press, 250 Leyland Lane, Leyland, Preston PR5 3HL.
Tel: 0772 623000

WRITING your first RISC OS compliant applications can be a somewhat daunting task – even for programmers well experienced in monotasking environments.

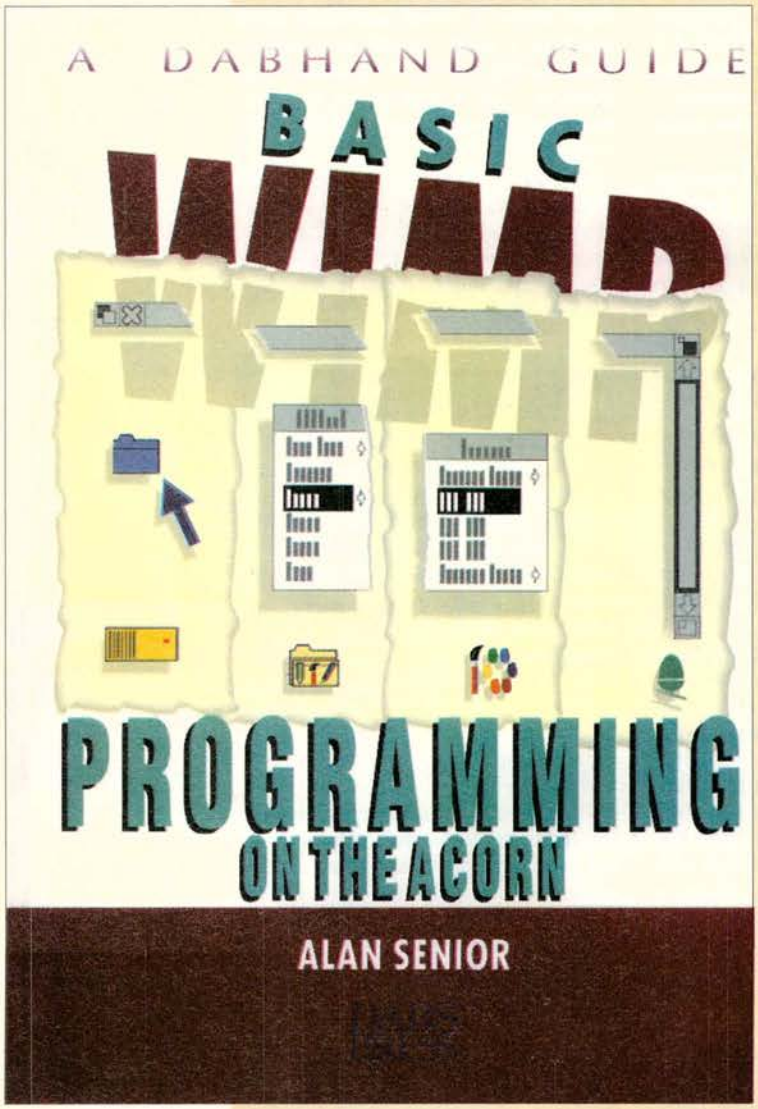
The Programmer's Reference Manual – PRM for short – provides all the necessary information but lends little help to those new to the quirks of desktop programming.

The aim of this 468-page book by Alan Senior is to bridge the gap by adopting a more friendly, easy-to-understand approach. As with other guides of this nature, a prior knowledge of the Basic language is rightly assumed – it is unlikely anyone could progress directly from complete novice to multitasking programmer.

The first part of the book is spent giving a complete overview of the desktop environment from the programmers viewpoint. Beginning with a look at the Wimp manager, the guide addresses issues such as the multitasking regime and how we interface with it through *polling*.

Windows, icons, menus and pointer are introduced as the basic desktop elements and further foundations of knowledge are laid with explanations of software interrupts in the form of *SYS* commands, how to create and use parameter blocks, along with a good description of what indirection operators are and how they can be used.

Next come a couple of chapters which concentrate on the structure of application directories and memory allocation and it isn't until Chapter 7 that actual programming is considered. It is definitely worth reading these early chapters – even if you do skip those covering already familiar territory – as they'll increase your general understanding.



New concepts are introduced gradually and programming ideas often develop as simple calls to a library of procedures and functions which is presented in the appendices.

You are given the general approach of each operation to digest but need not examine the intricacies of the coding in great detail until later.

This makes it possible for you to journey a good distance along the path of application creation with minimal understanding of how everything is happening. This isn't totally unrealistic as the best way of learning can often be through *hands-on* experience.

Over a third of the book is dedicated to the five appendices. The first three are concerned with the library of routines referred to throughout the text – stating the variables used, the dependencies of each individual function and procedure and, finally, the actual program listing.

The routines are competently designed and easy to follow – having a standard format, parameters with meaningful names and utilising local variables whenever possibly. Structures are indented for clarity and although only certain routines contain specific remarks, all are preceded by suitable identifying comments.

Appendix D brings to your attention some of the facilities incorporated in Basic V that were lacking in its predecessors.

It's not a comprehensive guide but gives a basic grounding in the most useful features – such as the CASE and block structured IF constructs.

The final appendix details most of the SYS calls used by Wimp programmers and presents them in more defined subsections than the PRM – Icon, Sprite, Window and so forth. A list of the subsections and the calls they describe – complete with cross-references to the Risc OS 2 PRM – are given at the front of the appendix.

The index appears quite comprehensive with items listed under sensible headings: My attempts to locate information using it were always quick and successful.

Screen grabs, diagrams and memory maps are used in certain places to help clarify vital points and assist in understanding subtle differences – such as that of the visible and work areas of a window.

The importance of making a user interface coherent with other desktop programs is briefly raised at the start of chapter three, but no particular guidelines on the recommended desktop style are actually given. There is, in contrast, a good section about actual programming style and technique.

Summing up

As a tutorial guide, *Basic Wimp Programming on the Acorn* succeeds: It is generally well written and ideas are presented in small, easy to digest chunks. Should you learn desktop programming with this book, it will also prove a valuable reference item – but not a complete replacement for the PRM.

Having all the routines tagged together as a single procedure/function library is a good idea and anyone with a partial knowledge of desktop programming, or their own preferred style of coding, can extract only the required sections quickly and easily.

If you have written programs in BBC Basic before and wish to learn how to take advantage of the multitasking environment, this excellent book should certainly be given consideration.

Squish: Supercharge your BASIC programs

THE idea of data compression has been around a long time, although most applications have focused on general file compression, not that of BASIC programs as in this case.

The program installs on the iconbar initially requiring 128k, but swallowing larger amounts as files needing compression are loaded.

Clicking Menu on the icon brings up a list of four options. The third toggles between fast and slow, determining whether or not the program multitasks.

The second option leads to a dialogue box which contains a list of all available compression methods and the means to select or deselect each.

Once the options have been set, compressing programs could not be simpler: Drag the source file to the iconbar, click on *Squish* in the window and answer any dialogues appropriately.

The information window will inform you of the effectiveness of the operation and you can proceed to save the newly shrunk file.

I was supplied with two versions of the program – one for RISC OS 2, the other for RISC OS 3 onwards.

The latter contains a few extra features, most notably the ability to *lock* certain variable, procedure and function names from being compressed. This is of principal use with libraries and is implemented using special REM lines.

The very versatility of BBC BASIC makes utilities like this difficult to design. Poorly written programs are unlikely to compact successfully under certain of the available options, but well authored software should work fine.

The authors appear to have given the program a great deal of consideration. A help file is provided which gives some guide to creating programs which will compact well.

My one niggle is that the *Options* dialogue box contains a seemingly pointless *OK* icon: Changes in the options were inflicted irrespective of whether or not it was clicked.

Squish is easy to use, competently designed and effective. I'd certainly recommend it for programmers who have to squeeze quarts into pint pots or wish their applications to take minimal WimpSlot amounts.

PRODUCT SPOTLIGHT

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Sound Lab: Making yourself heard

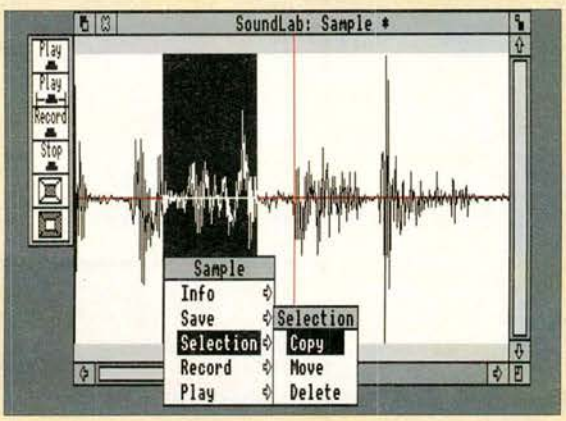
SOUND Lab captures and uses sound samples with your 32-bit machines and comes complete with microphone and three metres of cable, connector, phono adapter, instruction booklet and the sampler software on one disk which has been recently updated.

The condenser microphone provided plugs into the parallel port via a female standard jack connector which allows the use of any other microphone or instrument – a very useful inclusion.

This is so simple to use. Within a minute I had connected the microphone, loaded the software, opened up the Sample Window, clicked on record to capture my delightful voice, clicked on play and heard it played immediately through my monitor. It is as easy as that because the manual has, quite frankly, the most concise, uncluttered and friendly set of instructions I have ever encountered.

Once recorded, the sample can be altered in various ways. Adjusting the play back rate (Hz) by simply altering one figure allows your voice to mimic the piping falsetto of Mickey Mouse or emulate the ponderous bass of a recalcitrant hippo.

You can chop up the sample and delete or copy portions in an instant, playing all of it back or just a selection. When you have finished editing, the sample can be saved as an Armadeus file or as a relocatable module so you can alter the internal voices and use the sample from Basic.



The quality of sound reproduction is governed at least as much by the sound chip of the computer as the input device.

Having tested the mike provided, my own trusty Unidyne B and a very expensive Beyer recording model I discovered only a tiny improvement in sound fidelity so the reproduced sound will be as good as the Arc itself can provide which, incidentally, was very good.

Being able to plug my electric guitar in *directly* was useful for clean sounding samples, avoiding unwanted frequencies emanating from a miked up amp and speaker system.

There are extras. I had to be dragged away from watching the real time display option of my voice using the Oscilloscope option and FFT – which displays the frequencies – and warbling into the mike! Great fun this. So, how good is it all?

It's by far the most painless and easiest to use software and hardware I have ever encountered on the Arc due in no small part to the excellent manual which, for once, was written for human beings and not laboratory technicians.

If you want to produce sound samples for your own programs inexpensively and effortlessly here's some sound advice – buy Sound Lab.

Mike Goldberg

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Chemistry: Science revision

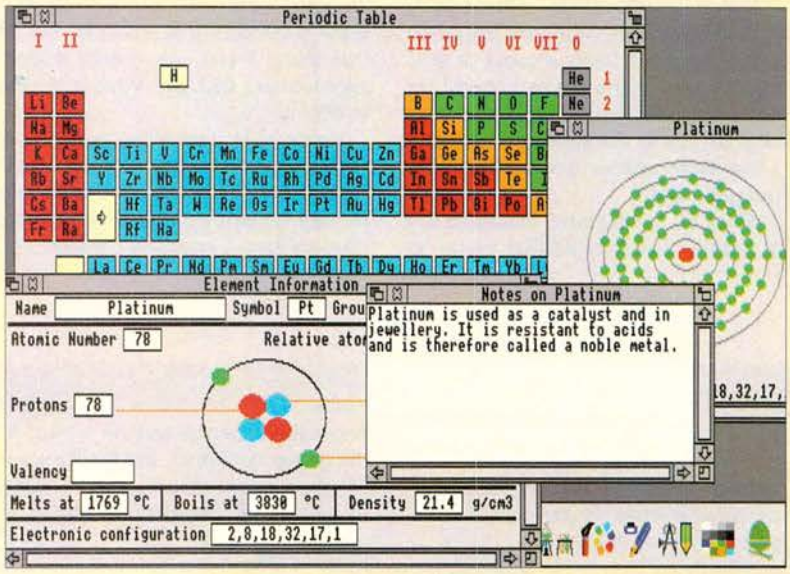
REVISION is always a laborious process and often there's not enough class time to go through revision notes. However, computer aided learning and computer assisted instruction are always popular with pupils and – as long as the process is effective – with teachers.

Chemistry lets you interrogate a database, mainly consisting of elements and their associated information. It gives instant reference on atomic configuration and physical properties of all elements within the periodic table.

Such speed of reference allows a search for your own patterns in the table, benefiting those with a keen interest in the subject, but may prove very tedious for others.

The program could have wider applications in the classroom as a teaching tool, taking the information from the database instead of the book. Pupils could use the package as a resource to help answer questions and complete worksheets.

As well as being a resource, Chemistry could even be used as an exercise itself. As well as containing all the fixed information, there are also *notes* that give information about the elements. So after a lesson on the halogens for example, pupils could create their own notes on the elements of group seven.



As an extra, Chemistry comes with several worksheets and some clip art. The latter wouldn't be particularly hard to draw yourself and is time saving rather than being invaluable.

The only minor niggle is that there may be too much in Chemistry. The package is aimed at GCSE level, yet contains all 105 elements. The GCSE syllabus only covers hydrogen to calcium and with more than this, pupils may be inclined to spend more time finding out about the other elements instead of the ones they need for the exam.

All in all, Chemistry is an excellent package with some unique features for pupils and teacher alike.

PRODUCT SPOTLIGHT

Price: £15
Supplier: PTW Software, 72 Frosthole Crescent, Fareham, Hampshire PO15 6BG.
Tel: 0329 281930

IronMask: The latest in security

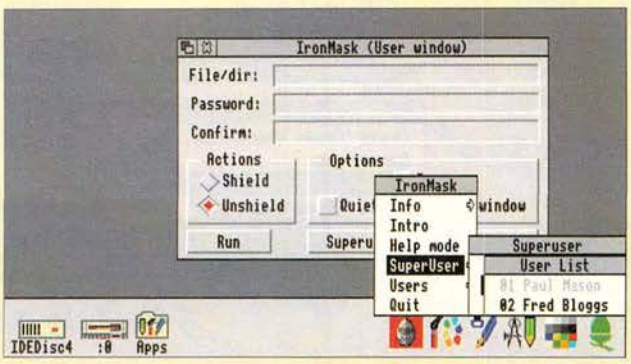
FOR many years now, the 32-bit machines have been without any form of system security, and just as with buses, two come at once. IronMask is aimed at any form of group using a single machine and not benefiting from a network's inherent security features.

Before using the system, the IronMask application must be copied on to another disk. This is used to create and remove new users.

The first time this application is loaded, the *superuser* is required to sign on, and is then given a unique ID which is required every time the application is run. Up to 63 users together with the main superuser can be created on the system. Everyone can shield files using a password which will then prevent any access to that file – including deletion, as well as encrypting it – in case the protection system is overridden.

As well as the !IronMask application, there is also the IronMaskMonitor module. This oversees all Filer operations – for example, when you run, delete or change the access of a file or directory.

If the operation would compromise the security provided by IronMask, it will intercept the call and bring up either an error window informing you of this, or a text message – depending on whether the operation was executed by command or within the desktop.



As well as shielding files, IronMask will also freeze directories. This means that the contents of the directory cannot be altered in any way – a similar idea to locking Nexus drives.

Once frozen, the contents can be thawed specifically, to enable some programs that are protected to write to their files without having to thaw the entire application.

The system does take a little getting used to once installed. The error messages that it gives are deliberately unfriendly, so as not to help the hacker. Indeed, the entire system has been reasonably well written so as to prevent hacking.

Of course, as with any protected environment, it is possible to circumvent, although I'm not saying how.

Overall, the system will definitely be useful for multi-user environments on a single machine.

PRODUCT SPOTLIGHT

Price: £69
Supplier: Turing Tools, 149 Campbell Road, Cowley, Oxford OX4 3NX.
Tel: 0865 775059

Wizzo 4 and 5: Speeding your way to hard disk security

PRODUCT SPOTLIGHT

Price: £29
Supplier: Ian Copestake Software, 1 Kingston Road, West Kirby, Wirral, Merseyside L48 5ET.
Tel: 051-625 1006

THE Wizzo series is a new range of plug-in roms for the A5000 and A4 machines. The 28-pin eprom fits into the spare socket next to to the RISC OS 3 roms in the A5000. A link must be changed, but this is easy – simply move a plastic jumper from one position to the other as described in the manual.

Once it's fitted, one of the main benefits of Wizzo is the ability to partition your present hard disk or disks. Up to four partitions can be created, although as each partition appears as a separate drive, you may find the iconbar becoming rather cluttered.

Once partitioned, Wizzo offers multi-level password protection. This allows you to protect the drives against unauthorised access, by requesting a password to allow entry. Drives can just be write protected or fully read and write protected by this method.

Power saving is one thing that should be well known to A4 users. Wizzo allows you to specify a time delay after which – if there has been no hard disk activity – it will automatically power down the hard drive.

Rather surprisingly for a third-party upgrade, Wizzo fully supports the multi-tasking Free and Verify displays of RISC OS 3. Indeed, the entire system has been very well written and conforms with the rest of the desktop – although a few poorly written programs may not recognise IDEFS.

Since all the features described are accessible using the IDEFiler menu, as well as by star commands, both casual users and programmers are catered for.

For a family or school that shares a computer, Wizzo's password protection and partitioning is likely to be invaluable.

The speed increase is only a minor feature – I achieved a fairly constant 10 per cent improvement when loading and saving files.

Wizzo provides useful features at a low cost. For anyone who requires password protection, it is worth buying for that alone. If you only require a speed improvement though, Wizzo is unlikely to offer it.

However, it does allow you to connect virtually any IDE drive to the A5000, which means it could save money when upgrading as PC hard disks are almost invariably cheaper.

CUProPad: Console control

PRODUCT SPOTLIGHT

Price: £45
Supplier: CU Electronics, 65a Middle Hillgate, Stockport SK1 3EH.
Telephone: 061-476 0576

MOST 32-bit games either use the keyboard, a mouse or a joystick. However, this new product allows you to use the popular Super NES ProPad. The system consists of two ProPads joined to a printer port connector.

Once it's plugged into your computer, you can load the CUProPad application from the disk which lets you configure the joypad to emulate keypresses.

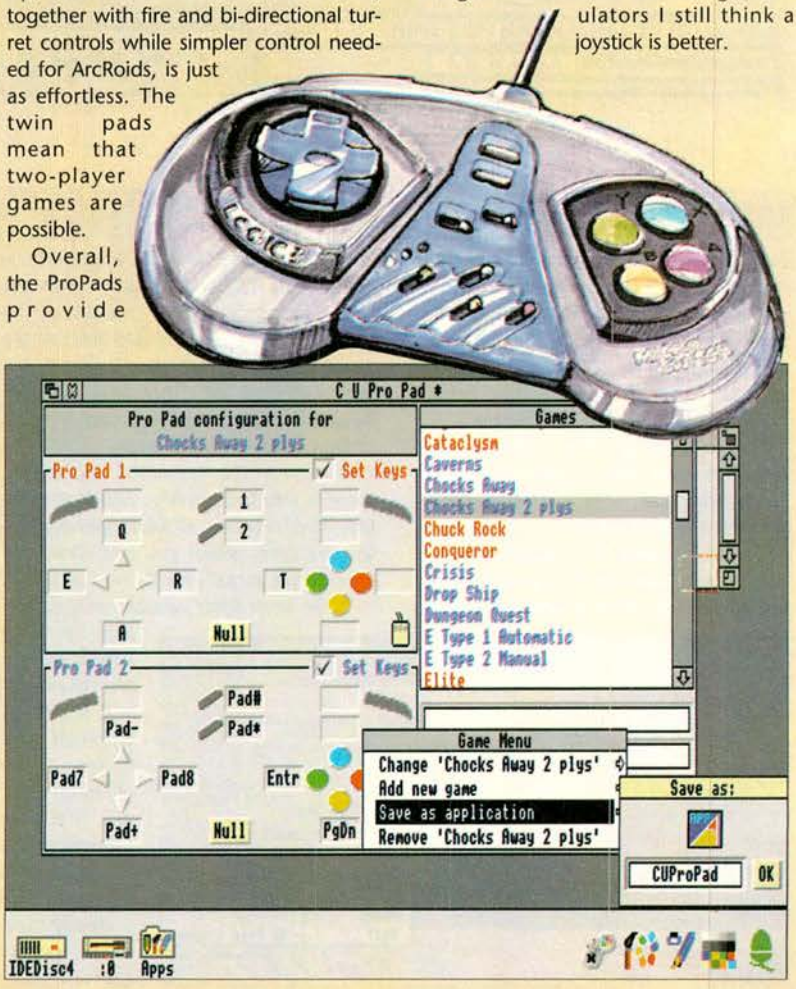
The CUProPad application is well written and resides in the desktop and has already been configured to work with most games – although it is a very easy task to create a new game definition if needed.

Once a game definition has been created, it can be saved along with the rest of the predefined ones or saved as an application that can be run without the CUProPad application. For the technically minded, the ProPad will work with any game using INKEY – working with almost all games, except those that operate within the desktop.

The joypads used are designed for gameplaying and because of this, they provide far more flexible control. Two rotation buttons are accompanied by four fire or direction buttons, another direction control and two more buttons for selecting and starting games, plus auto-fire options.

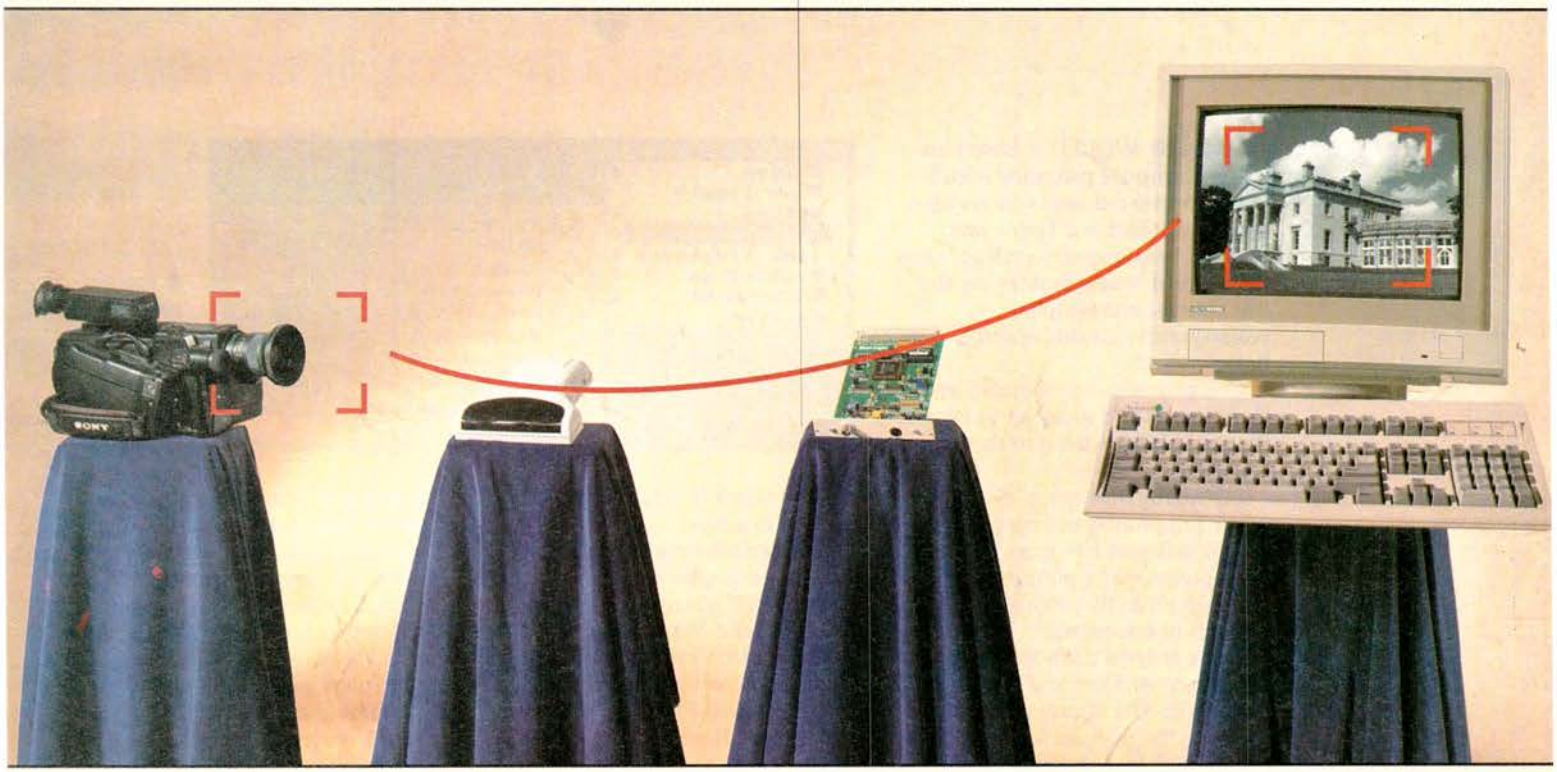
All this control means that just about any game type should be catered for. For example, Conqueror requires up/down control for both tracks, together with fire and bi-directional turret controls while simpler control needed for ArcRoids, is just as effortless. The twin pads mean that two-player games are possible.

Overall, the ProPads provide unparalleled control and are a must for the games enthusiast. But for flight simulators I still think a joystick is better.



SCANLIGHT VIDEO 256

• RAISE YOUR IMAGE CAPTURING POTENTIAL •



ScanLight Video 256 provides the ultimate image capture solution by combining the ScanLight 256 greyscale scanner and the GreyHawk fast greyscale video digitiser on a single expansion card.

By combining both scanning and digitising features on one card you can now have the best of both worlds. Scanners are ideal for capturing printed diagrams, pictures or photographs, while a video digitiser can be used to capture images from video sources such as video cameras or television. This single board solution saves not only money but also an expansion slot over the traditional two card solution.

Hardware

- Single width expansion board suitable for A300, 400, 500 and A5000 computers.
- Supplied with hand held greyscale scanner, 100 to 400 dpi resolution, 105mm scanning width.
- Monochrome, 16 grey level or 256 grey level image capture for photographic quality results.
- Straight edge scanning ruler to ensure straight and accurate scans.
- Composite video input digitiser.
- 256K RAM framestore, 8-bit, 256 greyscale digitising ability, real time capture.
- 768x288, 512x256 or 512x512 video capture resolution.

Software

- Ultra fast 'Take One' video preview application provides video in a window on the desktop – up to 50 frames a second at quarter screen size.
- ScanLight image processing software provides a host of processing options for captured images; detailed brightness and contrast control; on the fly screen dithering for best quality images in 16 colour screen modes; image cropping, rotating, enhancing, sharpening options; instant image rotation by any angle.
- Save images as 256 grey level sprites – suitable for practically any RISC OS software.

What's more, upgrades are available from the GreyHawk and some ScanLight 256 products. Details on request. The package is supplied complete with interface board, manuals and all software.

Min 2 Mbytes RAM recommended.

ScanLight Video 256 - £220 + VAT (£258.50 inc).

ScanLight 256 - £189 + VAT (£222.07 inc).

GreyHawk greyscale digitiser £99 + VAT (£116.32).

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Worlds of music

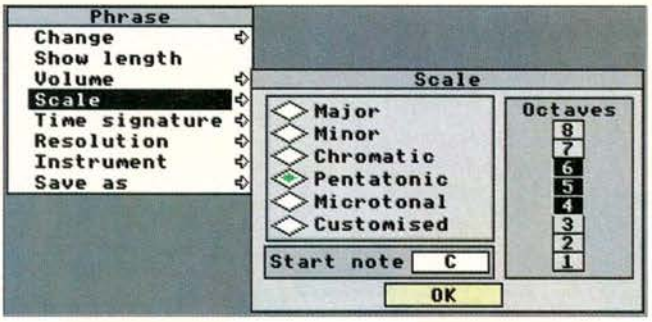
COMPOSE WORLD is based on the Compose program which first appeared many years ago for the BBC Micro. There was also an Ample version which used the Hybrid Music System on the BBC Micro and which consequently could produce better sounds.

Compose was very popular and Compose World looks set to take that popularity with it to the Archimedes.

Essentially, Compose World is a music program aimed mainly at education in which musical phrases are represented by pictures. You build up tunes by placing the pictures in a sequence.

There are two main windows – the Phrase window and the Sequencer. The Phrase window contains the pictures – double-click on one to hear the phrase it represents and you drag the pictures to the Sequencer window to construct a tune. There are insert, copy, and delete so creating an arrangement is very easy and flexible.

That's the basic principle but the program contains a wealth of other features such as the ability to loop the sequence or mark a section for repeated play. This is particularly helpful when developing one section of a tune.



● *You can select several different scales to create your musical Phrases*

You can also store a part of the tune – a sequence of Phrases – as a Phrase itself which you can insert into the tune. What's more, you can include *that* Phrase in another list of Phrases and store them, too, in a sort of recursive Phrase-making procedure. However, there are limitations if the Phrases in the selection use different voices or modal scales.

You can customise the layout to suit the tune in hand and specify the number of rows in the Phrase window and the number of boxes in the Sequencer. You can also alter their sizes which will be useful when using just one computer and monitor with a whole class.

You can create your own Phrases using a grid editor – the program has no notation facilities – which is somewhat similar to a drum pattern editor. The program can handle up to eight music lines or voices. Edit facilities include insert and delete, and you can adjust a note's pitch and length using the mouse.

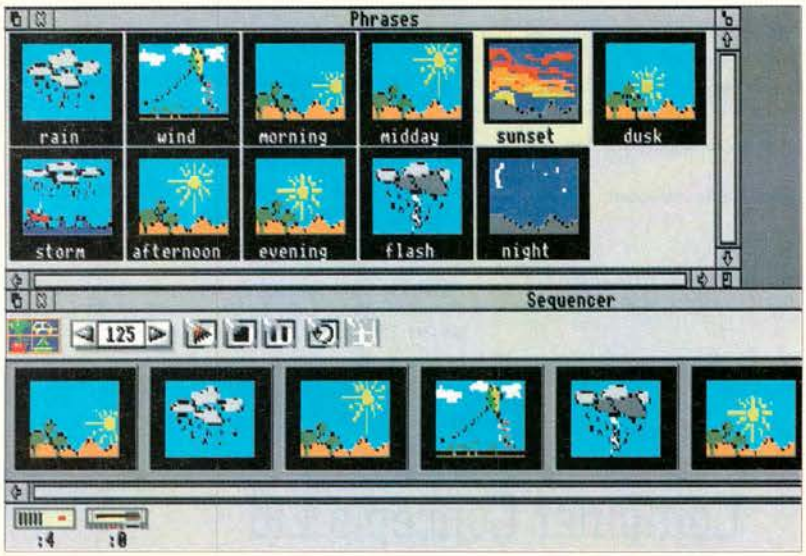
All notes are consecutive so you can't leave a gap for a rest between notes when you enter them. Rests must be created by giving a note a zero volume – fiddly, but it works.

The grid approach is best suited to users with little musical ability or who don't read notation. However, the grid does not directly show any pitch information, only octaves and certain scale intervals, and putting together a tune can be a try-it-and-see affair.

It seems reasonable to suppose that Compose World will be used in a music activity lesson so it's also reasonable to suppose that teachers involved will have a degree of musical ability and the grid approach may be too non-standard for some.

But you can load Phrases into Compose World from Maestro and from Standard Midi files so that should cater for users of all levels of musical ability. However, some Maestro files which didn't suit the Compose format made the machine lock up.

The grid editor does have some interesting functions. Although the standard display divides the octave into semitones (a chromatic scale), you can also select major, minor, pentatonic and microtonal scales as



● *The Phrase, Sequence and Display windows playing and showing a weather sequence*

Ian Waugh takes a look at software to complement the composer

well as create your own customised scales. The use of melodic scales such as pentatonic will allow students of limited musical ability to create harmonic phrases without worrying too much about *wrong notes*.

Edit functions include Reverse Pitch, Reverse Rhythm, Invert, Stretch and Shrink which the more adventurous can use to good effect. They can produce particularly interesting results on runs on eighth and sixteenth notes and music in the style of Bach.

Picture this

The more artistic teachers and students can create their own Phrase pictures and quite a sophisticated editor is supplied to help you do so. This includes tools such as pencil, line, box, circle, triangle, colour and fill and an undo function lets you undo the last change you made.

There are also upside down, reverse and cycle colour functions. Pictures can be saved as sprite files and you can load sprites into the program to be used as pictures.

You can create simple animated displays by showing a picture when each Phrase plays. This need not necessarily be the same as the Phrase picture which allows the more creative user to produce some interesting music/picture combinations.

The program uses the machine's built-in sample-based sounds and several new sounds are supplied on the disk. ESP produce a Voice Pack disk which contains 54 new sounds as modules – and very good they are, too. The Pack also includes the ClickVox program which lets you set up and reorder the Arc's sounds.

Compose World can also playback via Midi. Each voice can have its own Midi channel and Program Change number so you can produce some very powerful sounds indeed.

For users who have followed Compose's development through to this version, there's a program which lets you load material from an original Compose Tune file.

Over 30 tune files are supplied and these cover a wide range of subject areas. Some have excellent music associations – such as the set which plays the Teddy Bears' Picnic and the one with sea themes – but with many of the associations are rather tenuous. Well, what sort of phrases would you write on the subject of pets, mountains, road signs and gardening?

However, the object of the program is to stimulate thinking in a variety of ways, not just musically, and ESP also produce a Files Disk containing sets of Phrases with various themes. Many also come with a collection of suitable sounds.

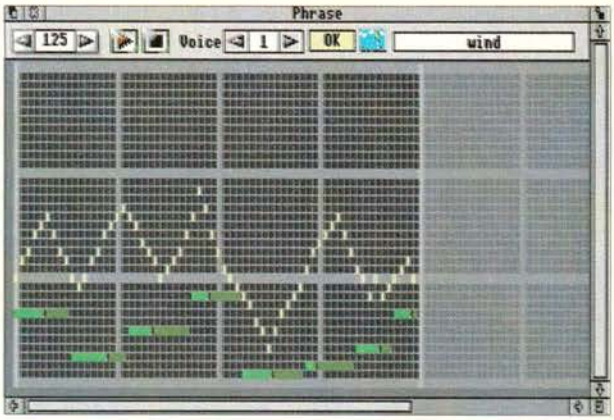
The Files Disk manual includes detailed descriptions of the files plus classroom ideas. These include creating a story from the pictures, investigating the moods some of the pieces suggest, exploring different types of scales and learning rhythmic patterns.

This disk is well worth the investment. A set of similar classroom notes for the pieces included with the main program would be very useful.

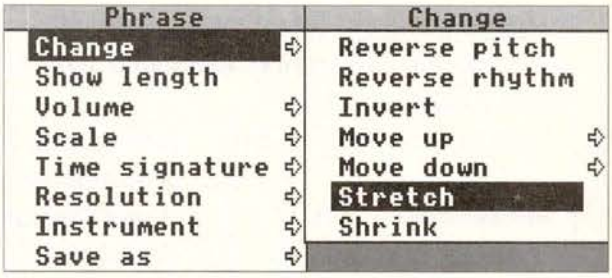
Summing up

Teachers familiar with Compose on the BBC Micro will love Compose World. The additional disks (particularly Files Disk 1) give a lot of classroom material before you have to think about creating any yourself. Armed with this amount of material, even the non-musical teacher will be able to present the program successfully to a class.

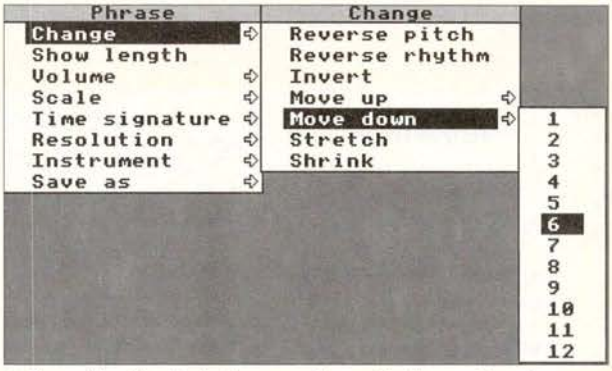
Compose World has a lot of potential both in a pre-music classes and in a general activity classes. It is also well suited to students with special needs. In fact, if you'll pardon the expression, it contains a world of activity to explore both in the music room and outside it.



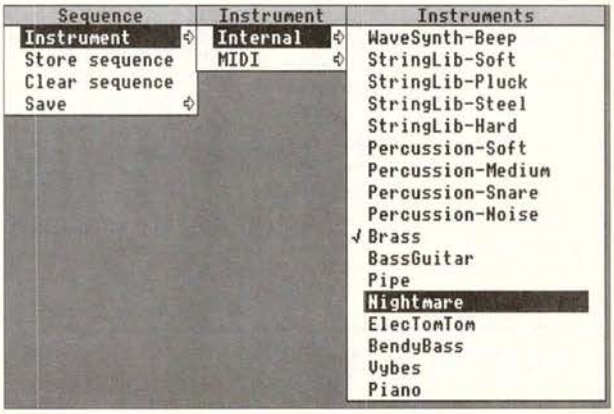
● *You can create your own pictures in the picture editor*



● *A particularly busy Phrase representing a windy day*



● *The grid editor includes several special Change functions*



● *Several new Arc samples are included with the program*

PRODUCT SPOTLIGHT

Product: Compose World
Price: £48
Supplier: ESP, Holly Tree Cottage, Main Street, Strelly Village, Nottingham NG8 6PD.
Tel: 0602 295019

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Technodream	21.25
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X-Fire	20.75
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Getting the message across

Clem Vogler continues his look at communications with a checklist of problems and solutions

LAST month I discussed the principles of serial comms and offered some advice on what sort of modem to buy. This month I'll be concentrating on some of the snags you may run into when trying to communicate using your 32-bit Acorn.

Lots of things can go wrong when you use a modem. I've divided these according to whether they occur before or during data transfer.

Before establishing the data link:

Modem doesn't respond when you type AT.

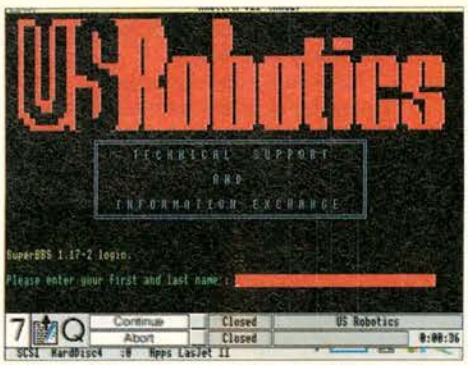
- Make sure you are typing in upper case (some systems accept lower case, but not combinations). Don't forget to press Return.
- Check your modem-micro lead has the correct pin connections.
- Check your software is accessing the correct serial port. Don't omit this because you've only got one port – the software may not know this.
- Make sure the software has put the micro into Terminal mode – otherwise you won't be able to send commands to the modem.
- Check the modem dip switches – especially the ones that control command set recognition and results code display.
- If you type AT but it doesn't appear on screen, local echo is off. On the other hand, if you get double characters *Iliikkee tthhiiss* it suggests that local echo is set twice – both modem and software are providing it. Either turn off the modem's local echo with ATE0 then Return, or set the software local echo to OFF.

No dialling tone

If the modem responds to AT, try ATD. The modem should go on line and await a dialling tone. The off hook light on the front panel comes on and if the modem has a speaker you hear dialling tone. Problems at this stage may be caused by:

- No phone link – have you plugged the modem into a phone socket?
- Speaker switched down or off. Is the modem's volume control turned up?
- Modem not waiting long enough for dialling tone. Typical default settings for awaiting a dialling tone are two seconds. Old fashioned pulse dialling exchanges in some parts of the country may respond too slowly.

● *Up and running as a communication package dials a bulletin board*



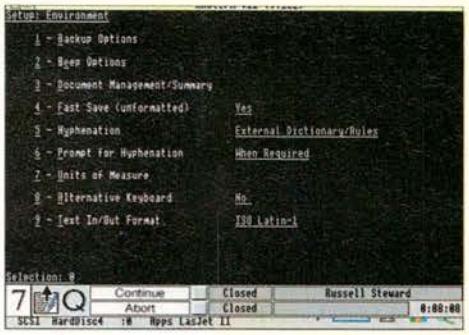
● *One of the many available bulletin boards*

BBS
Welcome Clem, this is your 9th call, and the 24224th call to the USR BBS.
Press [Enter] to Continue
You are caller number 2422
You have logged on 9 times before.
Your last time on the system was on the 26-Jul-93 at 23:15
The highest number message on the system is 2697
You have read up to message number 443
You have posted 1 Message(s) on the system.
You have Downloaded 42 k in 2 file(s).
and have Uploaded 0 k in 0 file(s).
Todays date is Tue 17-Aug-93
The current time is 22:04
The time of the next event is 23:50
You are logged into Node 1
Press [Enter] to continue
Continue
Abort
Closed
Closed
US Robotics

● *Big brother keeps tabs on his disciples*

● *A typical bulletin board menu*

● *Feeling adventurous? Try logging into a Unix system*



● *With a modem and a few phone numbers you can use software you've only heard about*

● *Do take note of the baud rate*

➤

If this applies, increase the delay or cancel the default disconnect time. The modem instructions should tell you how. If they don't, try ATX3. If it solves the problem, store it in the modem's NVRAM with ATX3&W

As a further check, dial your own number with ATD. You should get a busy response. You can force pulse or tone dialling with ATDP or ATDT respectively.

Making the connection

Both modems exchange carrier signals, but there is no data link

Are the calling and receiving modems locked to different link (bit) rates? If so, the receiving modem will hang up. The best solution, if your modem offers it, is to use variable linking which allows the two modems to negotiate the highest possible link rate. Refer to the modem manual, or try typing AT&N0. If you can't use variable linking you will need to match the remote modem's bit rate.

Hardware jargon

For two modems to communicate successfully they must use the same modulation standard and the same error control protocol. Modulation standards are set by an international standards organisation called CCITT.

Some examples are:

V.21 – Fax	Standard for facsimile operations at 300bps
V.21 – Modem	Standard for modem comms at 300 bps
V.22 bis	Standard for modem comms at 2400 bps including automatic link negotiation fallback to 1200 bps
V.23	Standard for modem comms at 1200 bps one way and 75 bps in reverse
V.32	Connections at 9.6 and 4.8 Kbps with fallback to the lower speed when line quality drops and fall forward again when it improves
V.32 bis	Connections up to 14.4 Kbps.V32 bis modems fall back to successively lower speeds when line quality drops and fall forward again when it improves
V.42 bis	Connections up to 16.8 Kbps with sophisticated error control and data compression protocols

During data transfer

Your screen displays double characters.

Your modem's local echo is on and the remote modem is also echoing. Switch local echo off. Some modems and software provide a useful option to have local echo turned on before the data link is established (to see what you're typing) and turned off when transferring data – to avoid double characters.

You get random, Greek or other funny characters.

Check that both modems are set to the same bit rate, word length, parity and number of stop bits.

Data transfer starts OK, but after a few lines you get gaps and missing chunks of data.

This is the classic sign of incompatible handshaking. It also applies to computer to serial printer links. Check to see that the software and modem are set for the same kind of flow control as the remote system – either software or hardware.

Data arrives corrupted or error ridden.

A sign that you are using inadequate (or no) error control protocol. The software and modem will offer various protocols and you need to use one which is understood by the remote system. The smoothest arrangements are those where intelligent software negotiates the optimum protocol with software at the other end.

Several seconds elapse before typing is echoed on screen.

This may be caused by a poor phone line. The delay results from the retransmission, possibly several times, of data which the receiving modem has requested. Try ringing again. The phone system routes calls differently on different occasions.

A good way to force a new routing is to ring an intermediate number – preferably a freephone one – in between. If you are unlucky, you may suffer from a noisy local exchange. This is more likely with elderly pulse dialling exchanges. You may be able to persuade the phone company to improve the line.

Handshaking

Serial devices use memory stores called buffers to store data awaiting transmission or just received. Since these buffers are of limited size, there has to be a way for the receiving device to signal that its buffer is full and the sender must temporarily stop sending.

A little later the receiver will need to tell the sender that the buffer is now nearly empty and transmission should recommence. This signalling is called handshaking, and may be by software or hardware.

A common form of software handshaking is the Xon-Xoff protocol in which the transmission of designated Ascii codes tells the source device to halt or resume transmission.

Hardware handshaking uses separate wires to transmit similar requests. There are various flow control lines in a serial connection. The full RS232 serial specification includes the pairs CTS/RTS (clear to send / ready to send) and DSR/DTR (data set ready / data terminal ready). The state (high or low) of the pins in one of these pairs is used to request the sender to stop or resume transmission.

Hardware handshaking is preferable to software handshaking if your channel supports it.

Parity checking

This is a simple method of checking for data corruption. Sender and receiver agree to send an extra bit and make an agreement called a protocol. Suppose they agree to use ➤

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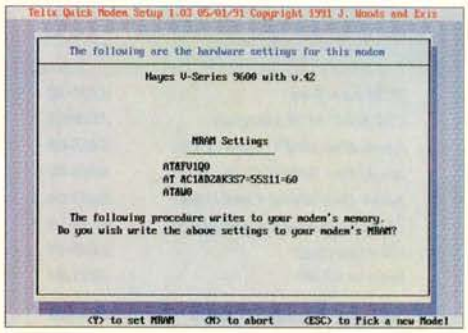
● *Also make a note of the file transfer protocols*

● *Conjuring trick – choose any modem, any one*


Telix Quick Modem Setup 1.03 05/01/91 Copyright 1991 J. Woods and Exis
The following are the hardware settings for this modem
Hayes V-Series 9600 with v.42
MNRM Settings
AT&FV1Q0
AT AC1AD2AK3S7=55S11=60
AT&W0
The following procedure writes to your modem's memory.
Do you wish write the above settings to your modem's MNRM?
<Y> to set MNRM <N> to abort <ESC> to Pick a new Mode!

● *Comms packages set up the modem for you*

➤

even parity. This commits the sender to transmit only bytes having an even number of bits.

If he sends the Ascii code for *g*, 1100111, he will set the extra parity bit to 1 so as to give an even number of bits – six in this case. If he sends Ascii *f*, 1100110, he must reset the parity bit to 0 so that the bit sum remains even – this time at four.

It works because the commonest form of data corruption is of a single bit. If a single bit is changed, the receiver will get a byte whose parity is odd and as this doesn't conform to the agreed protocol it will ask for the byte to be sent again.

Delays between typing a character and seeing it echoed on screen from the remote terminal are often the result of repeated resends demanded by error checking protocols.

If two data bits are corrupted, the parity check fails, so it's not foolproof, but this doesn't happen as often as single bit failure. Of course you could equally well use odd parity to check for errors. The important thing is that the Sender and Receiver adopt the same protocol.

Dual serial card

A drawback of RISC OS 3 over its simpler predecessor is that the operating system interrupts the ARM chip more frequently. This has led to problems with the Acorn internal serial port.

The internal port runs at 19200 baud and only has a one byte input buffer. If the ARM chip receives a string of interrupts it may not have time to empty this buffer before another byte arrives, in which case the byte is simply over written by the next one and your data becomes corrupted.

Of course, the comms software will usually put this right by requesting the lost byte again, but the data transfer rate is reduced and the integrity of the data may still be compromised if the error correction protocol fails to trap the missing byte.

This is more of a problem on A300/400 machines running Risc OS 3 than on A5000 machines which have a faster serial chip. It is also a problem which becomes more obvious as you try to use faster data transfer rates and even more evident if you are using a comms packet perched on top of several layers of applications software – as I found when running Windows Terminal under DOS on a PC emulator multitasking under RISC OS.

A neat interface board now available from The Serial Port provides two serial ports with a higher specification than the Arc's resident port. Not only do they match the fastest available modems with an impressive 115,200 baud maximum data rate, they also have 16-byte receive and transmit buffers.

Not only can you use the fast data transfer rates supported by the latest high speed modems, you can also rely on the 16 byte buffers to take care of the interrupt problem.

The high speed ports are also ideal for connecting to video cameras with data transfer rates in excess of 19200 baud. Not only do you get two fast serial ports, the latest version of the card includes a bi-directional parallel port thrown in for free.

A software switch lets you to use either Arc or PC cables and if you need improved serial performance, this board is good value. For those running out of podule slots, a micro-podule version is promised.

● *Next month I'll be reviewing the leading comms packages for the RISC OS machines and compare them with their PC equivalents. I'll also be looking at two different approaches to using the Arc as a fax machine – the software solution versus the fax card.*

Leading non-communication

If you type AT and your modem doesn't reply OK, something is wrong with the computer to modem link. Possible culprits are the pin connections on the lead. This is because modem serial leads and printer serial leads are wired differently, although both use the serial port.

A further complication is that Acorn serial ports require a different pin configuration to PC ports, for which most of the commercially available leads are made. The best advice is to obtain the lead from an Acorn dealer to whom you should stress the need to connect to a modem. For those of you brave enough (or poor enough) to want to make up your own, here are the connections:

Note that pins 1, 4 and 8 are linked at the Archimedes end.

If you are curious about the links in the RS232 interface standard, it helps to know that the connections are described from the terminal's/computer's point of view rather than the modem's.

	Archimedes 9-way D connector			Modem 25-way D connector	
	1	DCD			
	2	RxD	.....	3	RxD
	3	TxD	.....	2	TxD
link	4	DTR	.....	20	DTR
	5	ground	.....	7	ground
	6	DSR	.....	5	CTS
	7	RTS	.....	4	RTS
link	8	CTS			
	9	RI	.....	8	DCD

So the Arc uses the TxD line to transmit data to the modem and the RxD line to receive data from it. The modem, on the other hand, transmits through the RxD and receives through the TxD.

A matter of control

Mike Cook takes on another set of your Acorn technical queries

AGENDA

- Midi analysis
- Remote keyboard and terminal
- Temperamental monitors
- Password protection
- Soldering flux
- Accessing larger screens

Q MY A-Level Technology project is a Midi Analyser and for part of it I am looking to use my A5000 with RISC OS 3.11 as a controller and configuration storage system.

I have decided to use the parallel port to do this, but unfortunately I do not know the SWIs to read/write to/from it.

I also need to know whether the direction of data flow is software controlled, if there is a pin that determines it and if there is an event created when data is *strobed* in.

Your help would be most appreciated as none of the books I own has any information on this. – **J.M. Hornsby, Torquay, South Devon**

A *The SWI to access the parallel printer port is SWI &42EC1 – on entry to this R0 gives the reason code.*

When R0=0, on return R1 will contain the data register and R2 the status register. On the status register bit 7 is the state of the Busy pin and bit 6 is the state of the ACK pin. When R0=1, R1 should contain the data you want to store.

When R0=2, R1 will contain the EOR mask and the R2 and AND mask to set the state of the status register. The new state is = (old state AND R2) EOR R1. Bit 5 controls the data direction 0 for output on the data pins and 1 for input.

Note that this call is only available under RISC OS 3.1 and not RISC OS 3.0.

However, if you want to monitor the Midi signals you will have to use machine code as Basic is not fast enough. Midi signals are normal serial data but running at the non-standard speed of 31.25Kbauds.

Therefore, you are much better off using a serial UART to gather the data. You will still need a machine code routine to gather and store the input of the UART but you can do the rest in Basic. For further details see the Programmer's Reference Manual for RISC OS 3.

This is a rather complex project with the hardware you have but the best of luck anyway.

Monitoring the problem

Q I AM having a problem with my monitor and I wondered if it is a fault you are familiar with. It has been malfunctioning for about six months and every time I decide to do something about it begins to work perfectly.

It is an Acorn AKF11 and I've had it for about five years. After about 10 minutes the screen blanks out completely though the computer is still working as I can hear the program in the background. When the picture is there it's perfect with no distortions.

I have tried three ways to restart the monitor: I switch the computer and monitor off completely, I switch the monitor off and leave it for about 10 minutes and finally I give it a good shake. The latter works sometimes but it doesn't last though it does give me a chance to dismount the hard disk and park the heads.

It sound as if the problem is a loose connection. Would this be the kind of fault to take to a local repair man as my Acorn dealer is miles away? Or perhaps I am due for a new monitor. – **Peter MacDonald, Wincanton, Somerset**

A *It is, as you say, a loose connection either in the socket at the computer end, the lead or inside the monitor. It should be easy to trace and deal with.*

As to your point about the computer knowing it is about to be treated – about 50 per cent of faults I can cure by simply picking up a screwdriver and waving it threateningly in front of the screen

If you've just upgraded to RISC OS 3, could it be the screen blanker?

Lost words

Q HELP. I have acquired an old Symbiotic network system which is not used any more. Unfortunately, the hard drive format is corrupted and therefore the utilities ➤

Mainframe Master

Q I WONDERED if it would be possible to connect my BBC Master M128, which has dual 3.5in drives, to a monitor and keyboard and use it like a mainframe. If this is possible, what would I need? – **David Aston, Dudley, West Midlands**

A *Yes, it is perfectly possible to connect up your computer like this, though why you'd want to eludes me.*

You'll need a terminal unit, that is a keyboard and display. This works by sending serial data every time you press a key and displaying the Ascii or received serial data.

*Connect the terminal unit to the serial port of your computer and make sure the baud rates are the same using *FX7,X and *FX8,X to change them.*

*Make sure that the word format is the same on each machine, using the *FX156 command or the jumpers on your terminal.*

*On the Master, type *FX3,1 this means that each byte sent to the screen drivers will also be sent to the serial port.*

*Finally, type *FX2,1. From now on your computer will only respond to characters sent to it through the serial port.*

Your terminal now has full control. Note, however, that unless it can make sense of VDU graphics commands you'll only be able to see plain text on screen.

I used a similar set up some years ago to transfer listings from my Model B to my Macintosh. The Mac ran a terminal emulator program that spooled what it received to disk.

All I needed to do was to type LIST and my program listing was transferred to the Mac to be put in wordprocessor documents.

Nowadays, with many computers able to read PC standard disks, this trick is no longer necessary. However, I suppose you could use it to transfer from the older 8-bit machines to the 32-bit ones.

floppy is required to format the drive.

My problem is that, because of the length of redundancy, the password for this floppy has been forgotten and was never written down anywhere. I am therefore appealing for anyone who has a Symbiotic (Version 3.2) BBC utilities disk which could be borrowed.

Alternately, is there any way to decode the password on the disk? I know the system will probably be redundant throughout the country but not being able to use the system is driving me mad. – **Neal Pinder-Packard, Chesterfield, Derbyshire**

A Most systems use a hash algorithm for encoding passwords. That means that the password is not stored anywhere on the disk. What is stored is the result of mashing up the numbers that make up the password. So when you put the word in again and mash them up you should get the same number.

Therefore, it is not a simple matter to look at the disk with say a disk editor and read off the password. I can't really help on this one, but if there is someone out there who can, let me have the information and I will pass it on.

You can write to Mike Cook c/o Acorn Computing, Europa House, Adlington Park, Macclesfield SK10 4NP.

He will answer any questions about difficulties you may be having with your machines, mainly those to do with hardware. If you want a personal reply ensure that you enclose an SAE with your letter.

No printing

Q HAVING recently bought an A4000 to replace my PC186. I am very pleased with the performance but am having difficulty when printing.

I have an Olivetti DM600 24-pin dot matrix printer but can't find the correct driver to work with text or graphic output. Can I use my old printer or will I have to buy another?

I have misplaced the printer manual but would like to keep using it as it has continuous sheet feed and LQ output. – **Stephen Hinchcliffe, Shipley, West Yorkshire**

A I am not familiar with your printer but I'm sure that it can be made to work. Your A4000's RISC OS 3 offers a much more comprehensive choice of drivers than earlier ones.

The first thing to do is to make sure that there is a good connection between the printer and computer. I find it best to connect up the two and go into Basic – press F12 – and type VDU2 and a few lines of rubbish before typing VDU3.

Return will take you back to the desktop and if you have a good connection what you typed should appear on the printer. If not, you have a problem with the lead or the computer is configured to the wrong interface – serial when it should be parallel or vice versa.

Assuming that the test print is fine, you need to get the computer to produce the correct graphics codes for your printer. The Pro-X24E printer drives uses the ESC [g] graphic commands to produce a 24-pin dump.

It is unfortunate that you can't check the manual for this, but it would seem likely that this is what to use. If that gives little joy, try the Epson drivers. If all else fails, contact Olivetti for a replacement manual. You can then use this to build your own printer driver using the PrintEdit application.

Fumes and fluxes

Q I MAY be able to help with a couple of points raised in the August column. Barry Watt's problem with the mouse can be solved by a visit to the local Maplin shop and an outlay of about 30p as I am sure that one of the tactile switches listed will do the job. If not, RS list similar ones but you have to buy five.

With reference to the low fume – I take it you mean Multicore's X32 flux – we have been using this successfully in production for a couple of years. The secret is that you must use a temperature controlled soldering iron set at 700 degrees Fahrenheit.

Incidentally we still use regular 362 flux core for general soldering around the workshop as this provides the best performance on prototyping and repairs.

Regarding lead-free solder, Multicore have recently announced a version for electronic work with a 99 per cent tin and less than 1 per cent copper composition. I am waiting for a sample of this which will also have a low fume flux.

Apart from being low fume the X32 flux also makes it unnecessary to clean out PCBs for cosmetic or other reasons after assembly due to the low flux residue left behind. – **Kevin Reeman, Ground Control, Hullbridge, Essex**

A Thank you for the information, however, I must disagree about the low fume solder. I used a Weller magnetically controlled iron with a tip temperature of 370 degrees Celsius/700 degrees Fahrenheit and I was very disappointed by the results. The joints took longer to solder, the solder did not flow properly and they were dull looking.

There is a type of X42 which has a small halide activator and it claims to solder faster and on a wider variety of surfaces but I haven't tried it. The manufacturers recommend a cooler iron tip temperature of 308 degrees Celsius for both low fume and the normal 362 flux solder 60 per cent tin/40 per cent lead.

*The 40 per cent tin/60 per cent lead combination is recommended for normal electronic work but needs a hotter tip temperature of 354 degrees Celsius whereas the **save bit** solder with the traces of added copper requires 335 degrees Celsius.*

I think you may have found the low fume flux satisfactory because of your manufacturing application. Here all components will be very new and clean and not have been lying about in a junk box for a few years which is more likely the case with most home constructors.

On the big screen

Q I HAVE used a 21in Opus monitor – made up from parts – for many years first on a BBC B and now on my Master. The connection is by the RGB din socket.

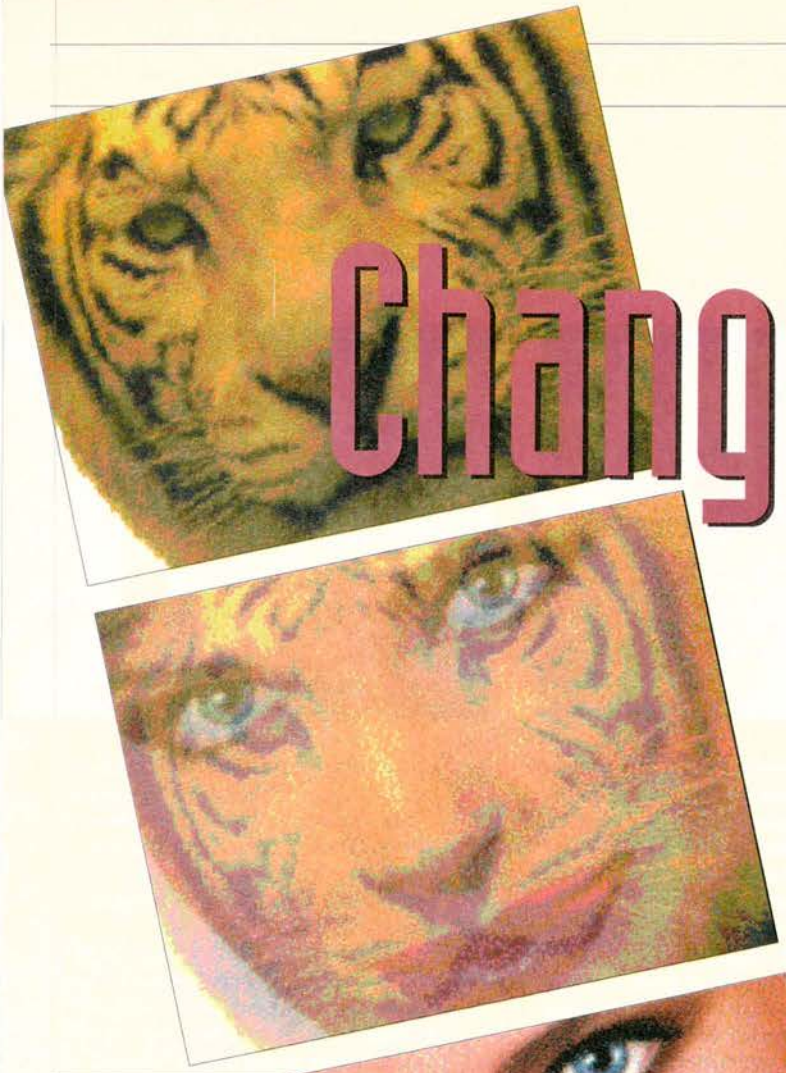
I now own an A5000 with 12in multi-sync monitor and as I tend to suffer from eye strain from this monitor I wonder whether it would be possible to convert the 21in monitor for use with the A5000. Even expensive modification would be cheaper than buying a new large monitor for the A5000.

If that is impossible could I use my 20in Sony TV instead? I once had an A3000 with the rather odd 2in connector which did fit the Sony and worked perfectly well. I suppose a special connector would be needed, but even having to buy a secondhand TV would be cheaper than a new large monitor. – **Jim Vernon, Topsham, Exeter**

A If your original monitor has a TTL input, in order to use it with the new machine this must be converted to an analogue input. If it is not converted the colours you get will be rather strange and limited to eight, including black.

Depending on the input circuitry of the monitor it might be an easy matter to convert. Most TTL input monitors have a switching transistor at the front end to saturate the signal fully. This could be removed but I would recommend you get a competent TV engineer to look into this.

You would be limited to the screen modes below Mode 20 and again if you use these low modes there is nothing preventing you from using a TV set. The rather odd connector you used was a SCART plug and is fitted on most quality TV sets – you just need the correct lead making up.

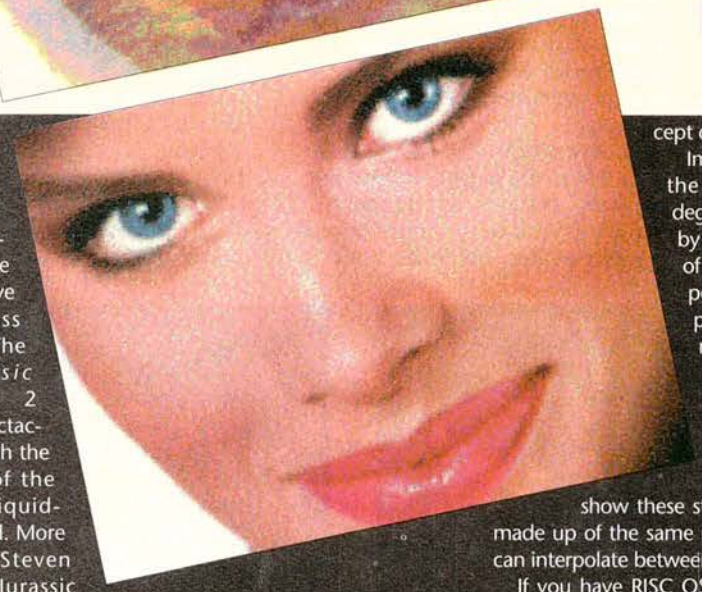


Changing faces

Rob Miller metamorphoses into something completely different

PRODUCT SPOTLIGHT

Product: Morpheus
Price: £34.95
Supplier: Oregan Software Developments, 36 Grosvenor Avenue, Streetly, Sutton Coldfield B74 3PE.
Tel: 021-353 6044



UNLESS you've spent the last couple of years in hibernation, you're bound to have come across morphing. The *cyber-classic* Terminator 2 used it to spectacular effect with the animation of the infamous liquid-metal android. More recently, Steven Speilberg's Jurassic Park used morphing to bring dinosaurs to life on screen.

Morphing is essentially the transformation of one picture into another, producing a number of *in-between* frames. Elements in the first picture are graphically *stretched* over a number of frames to become some other element in the second picture. An example might be somebody's nose elongating, or someone's eyes opening or closing.

Before continuing on with an explanation of how morphing works, it's important to mention interpolation, plus its relation – and difference – to morphing.

Interpolation

Interpolation – or in-betweening – is similar to morphing but is used to change from one vector or line-based picture to another. It's been around for some time and even Acorn's Draw application allows the transformation of one object into another.

To get an idea of how morphing works, it's important to understand some of the theory behind interpolation. The following example is particularly simple, although the same concept can be applied to any shape or shapes.

Imagine two rectangles, one smaller than the other as well as rotated through 45 degrees. If you draw the two rectangles side by side and draw a line between each point of the first rectangle to the corresponding point on the second, you then have the path through which the first rectangle must travel to become the second.

If you then divide each line you've drawn into say, eight equal parts, you have the points that when joined together, form the *in-between* shapes for the interpolation. Figures I and II show these stages. As long as you start with a shape made up of the same number of points as the end shape, you can interpolate between them.

If you have RISC OS 3 you can try it now by drawing two shapes – making sure that they have the same number of points – and using the interpolate tool to blend between them.

Morphing with bitmaps

True morphing works on two-dimensional, bit-map pictures, and, hence, uses a slightly different technique to achieve the transition from one image to another. Two changes actually take place: The stretching of one area in the start picture into a corresponding area in the end picture, plus the changing of pixel colours – similar to fading from one picture to another.

As bit-map pictures are made up of single pixels, there are no fixed reference points which can be moved. These have to be provided by means of an overlayed grid of *knots* that can be stretched to fit around prominent parts of a picture.

Two grids are required for morphing: One for the start and one for the end picture. Sections in the grid start off as squares but can be stretched by moving the knots around. Each quadrilateral from the start grid has a corresponding quadrilateral in the end grid and it is these areas that are stretched during the process of morphing.

MORPHEUS is the first commercial morphing program and comes courtesy of Henrik Bjerregaard Pedersen, who has already written a number of excellent PD graphics based programs.

When first loaded, it is inactive until two sprites – one for the start and one for the end – are provided. These are both stored in a directory which in turn is dropped on to Morpheus. This directory is used by the program to store further data such as the grid information.

Due to the way Morpheus works, the start and end pictures must be of identical resolution and mode. Several types of picture file are catered for including standard sprites, as well as 15-bit per pixel sprites and 24-bit Clear files.

A special feature is built into Morpheus that allows 1-bit – black and white – versions of start and end pictures to be used as reference images. Ordinary start and end pictures are still included in the directory so that colour images are generated. This feature is particularly useful if you're trying to morph between two large images, or if you have limited free memory in your computer.

Once you've created a directory and saved two pictures in it, the whole lot can be loaded into Morpheus. Doing this gives two windows, one for each picture, plus a small tool-box containing the more commonly used features. Each picture has a grid of knots overlayed upon it, Figure III shows this.

Editing one of grids is simple and is just a case of dragging knots around with the mouse pointer around prominent areas in the pictures.

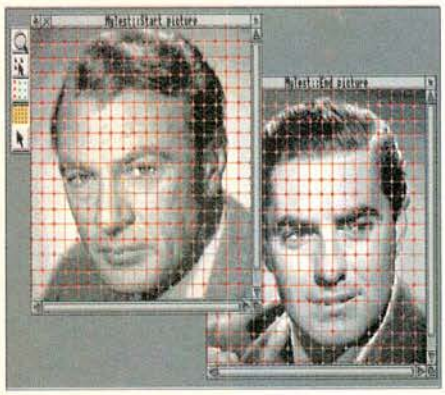
In the example I've chosen two faces where the parts to morph are obvious – the eyes, nose, mouth and so on. You can of course morph any picture into any other, but it makes sense to choose two images with at least a few similar features.

Knots can also be made to move along a curved path. By using this carefully you can achieve some interesting results such as bulging and stretching.

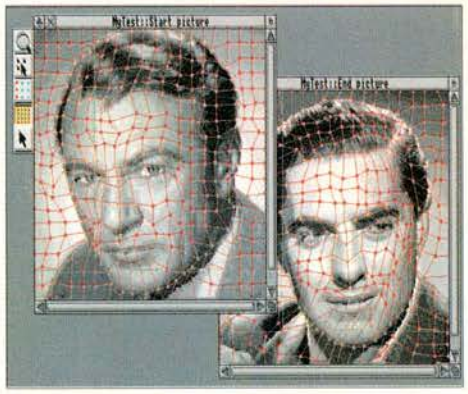
A special path editor is used to edit the shape of a curve which is controlled via two points – similar to Bezier curves in RISC OS 3 Draw.

One particularly useful feature when editing the grids is the ability to highlight different knots in different colours.

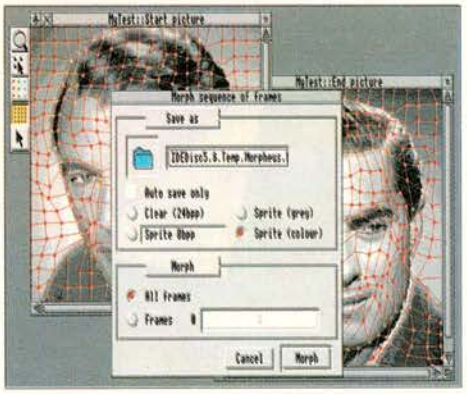
If, for example, you wanted to make sure that an eye in the start picture changed to an eye in the



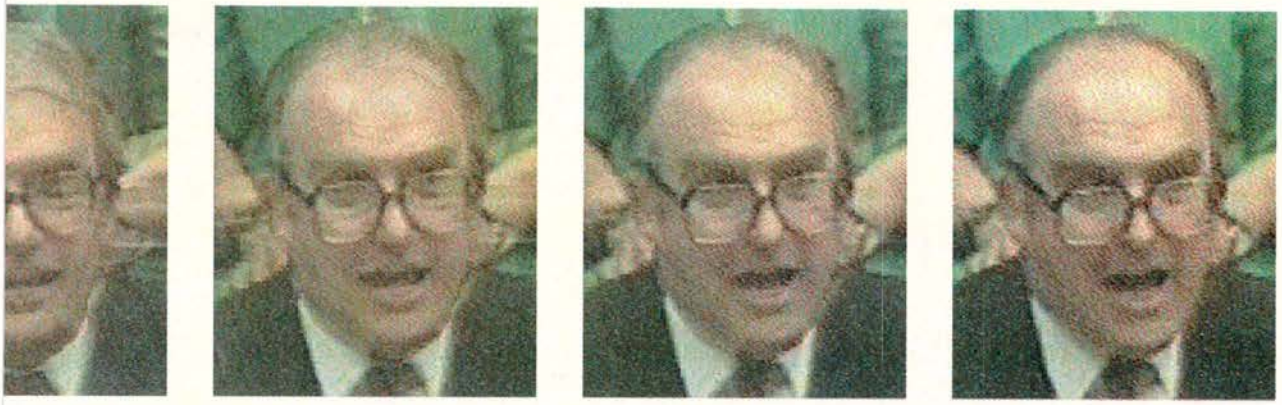
● *Figure III: Loading images gives two windows, one for each picture, plus a toolbox and an overlaid grid of knots*



● *Figure IV: Editing the grids is helped by the ability to highlight different knots in different colours*



● *Figure V: The morphing options window enables you to save in a variety of formats*



end picture, you first edit the first grid, highlight the knots around the eye, and hey-presto, the corresponding knots in the second grid are highlighted, as in Figure VI.

It's easy to lose track of which knot matches the corresponding knot in the second grid, especially when using a larger grid. Various tools allow you to insert and delete rows in a grid and the ability to highlight separate knots becomes increasingly important.

Morphing

Another feature to experiment with is speed. You can select upto eight groups of knots which can be morphed at different rates using the speed window.

Before morphing can be carried out, you must tell Morpheus what sort of output you require – sprites, clear files and so on – as well as the number of in-between frames and where you want it to store the resulting frames. This is simply done by dragging a directory icon to the relevant filer window as in Figure V.

Once the Morph button is clicked, all you need to do is sit back and let Morpheus do its work. Even though the process is quite complex, Morpheus is fast producing full screen Mode 15 frames at about two a minute on an ARM2 machine.

As well as producing sprites, Morpheus can generate three types of animation file. A MorphFilm is a small application holding an animation field and necessary code. These are delta-compressed and can run in the desktop or take over the whole screen.

Replay is rapidly becoming the standard for animation and Morpheus supports it by generating films of frames. Files are stored with 24-bit colour so a morph sequence of two Clear files can be seen in full colour, providing that the right hardware if fitted of course.

Both Computer Concept's Colour Card and State Machine's G8 are currently capable of displaying Replay files in 15-bit colour.

ViA files can be created too but these are larger as they are uncompressed being used as an in-between stage when generating Replay files and can be editied with suitable software.

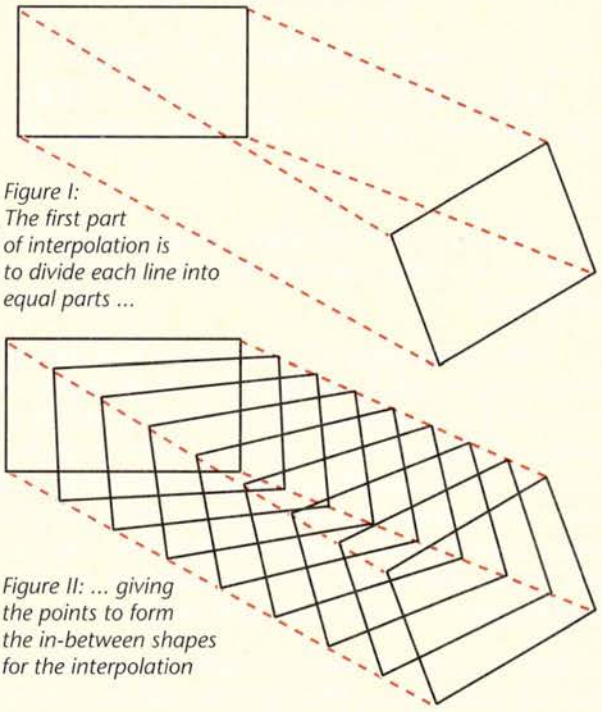


Figure I: The first part of interpolation is to divide each line into equal parts ...

Figure II: ... giving the points to form the in-between shapes for the interpolation

Summing up

Morpheus is similar to ray-tracing programs in that it's a solution looking for a problem, although it is great fun and could even be described as addictive. If you've got a powerful enough computer – lots of memory, and some kind of graphics accelerator – the results can be outstanding.

Morpheus is an excellent introduction into the world of morphing and a useful tool for animation tricks. I don't think this will be the only morphing package for long, but it will take some beating for its clear design and ease of use.

THE DUNGEON

THE DUNGEON

Created by MARTIN DENNETT
with assistance from JOHN PARKER,
DAVID POSTLETHWAITE and GORDON KEY.

-o-

They had found the entrance, overgrown and carefully blocked up, near the top of a cliff, just as on the parchment . . .

. . . Without warning, the floor they had moved onto dropped almost imperceptibly downwards with a sharp click and gaping holes opened up in the path in front and behind them, leaving them stranded on a pillar of rock. Moroth cursed their stupidity at falling into such a trap, and at that very moment the floor under their feet also vanished and they tumbled and slid down and down, to land dazed in a heap on a wooden pad in a small room far below . . .

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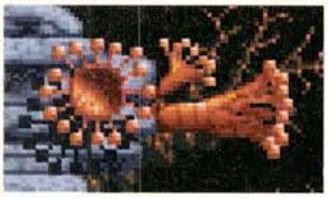
XENON 2

...vertically challenging

IN the last few years the two biggest selling vertically scrolling shoot-'em-ups on the Amiga have been SWIV, which Krisalis converted ages ago, and Xenon 2. And now the newly formed GamesWare have brought that paragon of blast 'ems to the Acorn screen.

Double-clicking the directory icon brings up a window with information about the game which disappears after three seconds leaving an icon on the iconbar which just has Info and Quit options on its menu. This program occupies just 2k.



Clicking the icon takes you into the game proper allowing you to select joystick or keyboard, music on/off and one or two players. Using the CU joypad it is possible for one person to play the two-player game using just one pad and the auto-fire option – silly but fun.

You're then presented with the weird landscape of someone of unsound mind. The whole thing is very organic and everything you're fighting against appears to be a living creature – fauna and flora. They're all lethal nonetheless.

One aspect of Xenon 2 is that if you bump into the background scenery – there are two layers of parallax scrolling background – you don't explode, you just get caught on it and if you are at the bottom of the screen the scrolling stops.

Not only that but by using reverse thrust you can actually scroll the scene backwards. This is very handy because it's possible to get caught in dead-ends and you have to retrace your steps.

As each set of baddies is seen off, a little bubble appears with a C on it – this is cash which you collect. Much less often metal capsules float on to the screen. These are standard power-ups and initially give you speed and a rear gunner.

Somewhere around the middle of the level you're suddenly whisked off to a shop where you can spend the cash you've collected on more power-ups. In fact you can sell equipment you've already got – although the nicely animated alien trader will not give you a good price.

If you want a bit of fun, buy the *nashwan*, it's relatively cheap and gives you 10 seconds of every power-up you could buy.

It's a pity the nashwan doesn't last a bit longer because at the end of every level there's a very nasty baddy that can take a lot of damage before popping its clogs, rolling over, turning up its toes, and leaving behind enormous amounts of cash bubbles to pick up.

So, the graphics are very good although not as good as some more recent games, there's plenty of music and sound effects and the gameplay is excellent. What more do you need?

Lazarus

Read this now

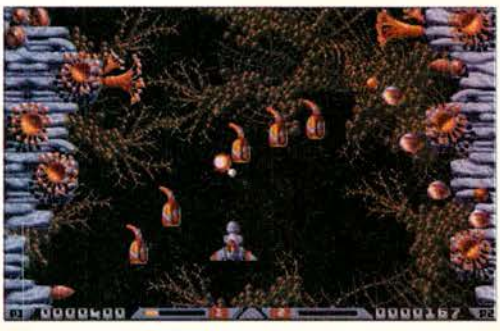
If you've played the demo version of Xenon 2, like me you may have formed the opinion it's slow. Please believe me that the real version is full of energy and brilliant to play.

PRODUCT SPOTLIGHT

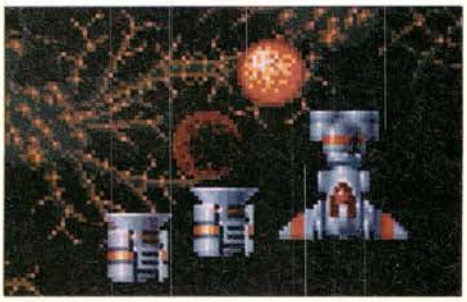
Price: £25.99
Supplier: GamesWare, Unit 26, The Bartletts, Hamble, Hants SO3 5RD
Tel: 0703 456523

● *End of level one – and you!*

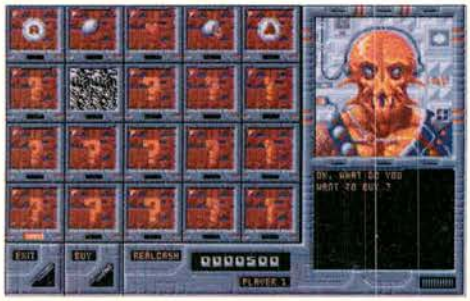
● *Not shooting fast enough...*



...you'll never make it



● *Beam generators on the left*



● *You pays your money ... if you've got any*

● *Say Bye Bye to the nice alien*

The Crystal Maze

...shiver with antici–pation

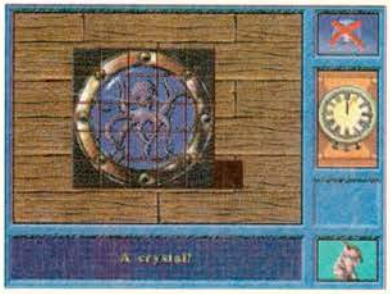
WE had hoped to be able to bring you a review of The Crystal Maze, but although it's been developing very rapidly it's not yet complete. Much has been done in the last month and by the time you read this it *will* be ready, so here's a selection of screenshots of the story so far and we'll have the review of the finished product next month.

PRODUCT SPOTLIGHT

Price: £39.95
Supplier: Sherston Software Ltd., Swan Barton, Sherston, Malmesbury, Wilts SN16 0LH
Tel: 0666 840433

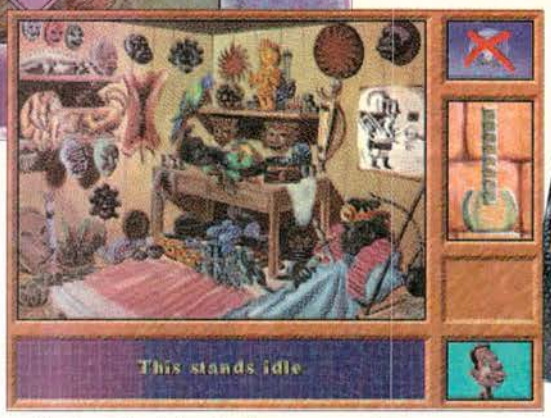
● *Well somebody usually gets wet somewhere in the show*

● *Nuts, I just can't do it!*

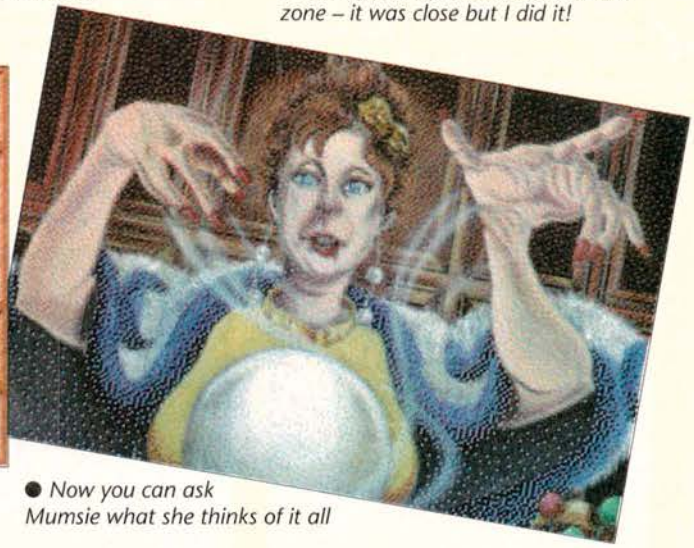


● *Sliding block puzzle in the Oceanic zone – it was close but I did it!*

● *Select your input media. There are two types of game: Thinking (skill, mystery, mental) and action (physical) and you can choose whether you want keyboard, joystick or mouse for thinking games and joystick or keyboard for action ones*



● *Playing Cluedo in the Aztec zone – how good are you at cryptic crosswords?*



● *Now you can ask Mumsie what she thinks of it all*

● *The Futuristic, Oceanic and Medieval zones*

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playback from "*" commands to provide easy software control

A built in Acorn Standard MIDI interface with IN, OUT and THRU connectors
- this allows you to connect any external MIDI equipment to your computer

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- exclusive MIDI demo files
- RiscOs sample playback software

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3 x 5pin DIN sockets (MIDI - IN, OUT & THRU)
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News Trade Distribution: Comag 0895 444055

Printed in the UK by BPCC Magazines (Carlisle) Ltd

What's new and who's who at World of Acorn

PamTurnbull sneaks a look at products and events not to be missed

IF you are going to the World of Acorn Show, Acorn promise you a visionary experience. But what's in store for your machine and your wallet? Let's take a look at some of the major products and producers who'll be there.

One of my favourite sides to computer shows is looking at what people are developing – hardware and software – and speculating whether or not these dream products will make it into production.

I'll be covering the most promising of these in our Special Issue due out in December. However, there are already some hardware and software releases to make you stop and take stock – here is a selection which have caught my eye.

Acorn are indulging in a little forward marketing with hints of VIDC 20, 24-bit colour – although, apparently, not everyone at Acorn is apparently convinced that this is what the users want – and ARM 700.

A little bird tells me that the latter is now in beta test and that those clever chaps at ARM have managed to get the 600 series down to ARM 250 size without heat problems. Academic exercise or practical experiment? We'll have to wait and see.

Furthermore, Acorn and ARM have devised the IOC20 which will allow future Acorn machines to contain both an ARM *and* Intel microprocessor at the same time. This has been hinted at for some time and is a logical extension to Acorn's *best of both worlds* philosophy.

Product manager, Peter Bondar, has it that the IOC20 will control all access between the system memory and the processors and will work with either.

When is this clever chap to make an appearance? Well you could look for it at the show but the most Acorn are about to reveal is that next year there will be Acorn machines with a vacant slot where an Intel chip can be plugged. Add this alien beast to your Acorn and you'll be able to switch between Acorn and Dos/Windows applications.

Let's leave the future and look to the present.

Acorn

AS TO be expected Acorn (0223 254254) are rolling out the red carpet for this their first mass consumer show.

To add a spot of non-computer entertainment they have hired jugglers, face painters, magicians and comics as well as offering spot the alien and hologram competitions.

However, to show off Acorn in a different light are Laser Grafix. This Royston-based company specialise in creating spectacular laser light shows for rock bands, night clubs and theme parks all based around an A5000.

Sequences are developed to be easy to use so that even the Prisma single output system is able to display far more effects – including text – than conventional twin and triple scan setups.

Two types of laser will be in evidence: Argon produces blue and green light leaving the Krypton to give the red.

Combining these produces white light which can provide the full colour spectrum. This will all add to the atmosphere in the games arcade which, for ➤

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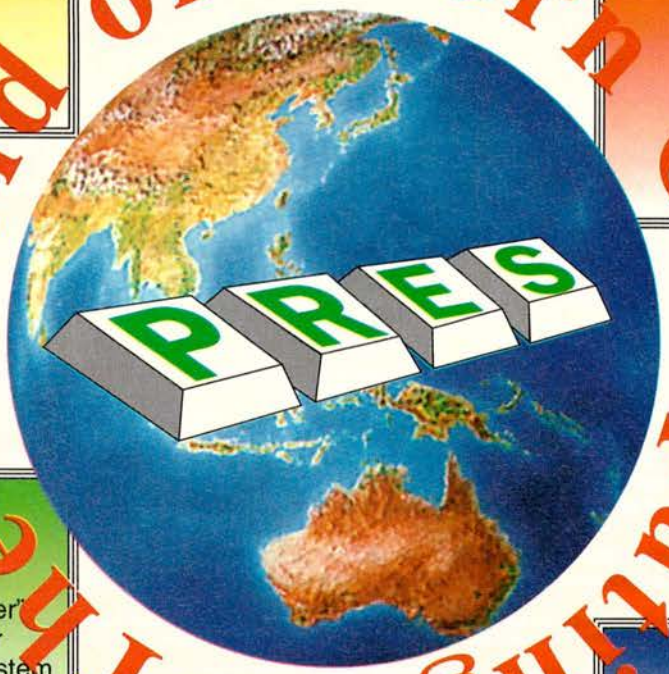
The World of Acorn Computing



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➤

those in the know, is designed to look like a crashed spaceship.

A number of special offers are available, for instance, the Science Museum are offering free entry for children.

Kodak are showing off Photo-CDs and if you bring along any Kodak 35mm film they will give you a 25 per cent discount against the cost of producing a Photo-CD, negatives and set of 6x4in glossy prints.

Not to be left out Acorn will be *giving away* their NewLook desktop on disk as a joint promotion with TDK – they only have 15,000 so get there early. In addition, if you bring your Pocket Book along, Acorn will download some public domain software on to it.

No Acorn show would be complete without an education section but this one comes complete with abseiling tower, based on the theme *IT in Action*. Children from local schools will be monitored in their descent by computers checking their pulse and respiration. In addition, schools will be showing how they use full motion video, create architectural designs and do cost analyses.

Commenting on this departure from the normal style of show, Acorn's show director, Kevin Coleman said: "With a separate area underlining Acorn's vision for the role of technology in education the show will demonstrate how technology can benefit everyone and actually make learning exciting and fun".

Clares — Stand 37

NIGHT SKY was first previewed at BETT earlier in the year, but the show will see its official launch. Aimed at schools, as well as insomniacs, it is surprisingly easy to use for such a powerful and complex program.

The database of stars is very impressive – 26,104 stars down to a magnitude of 7.55 – as is the ability to view the whole or part of the sky anywhere on earth at any time past, present or future.

The whole program lends itself to individual configuration so you can control which stars and planets will be labelled and add your own comments after the map is drawn using the *tagging* facility.

To compute the position of sun, moons and planets is straightforward letting you examine solar eclipses and lunar occulations. You can also follow the precession of equinoxes and proper motions and data can be saved as sprite or drawfiles.

For anyone new to the subject, jargon is highlighted and the tutorial is written with a newcomer in mind. NightSky will run on a 1Mb machine but you'll need 2 or 4Mb to explore its potential to the full.

Contact Clares on 0606 48511.

Computer Concepts — Stand 67

TWO new versions of Impression will be on display from Computer Concepts (0442 63933). First is Impression Style aiming to be industry-standard word-processor in the Acorn market.

It will incorporate Collins' GEM synonym thesaurus and dictionary with pronunciation guide – which can also be bought separately as WordWorks for £39 – contents and index building, plus handling of documents larger than your computer's memory, Tiffs – using a system of filters – and the ability to use 15 and 24-bit pixels.

Impression Style will take the place of Impression Junior and is aimed at the occasional letter writer, student, small businessman or professional writer and incorporates most of Impression II's features when it comes to complex page layouts. The cost is £99 and though you could squeeze it into a 1Mb machine, 2Mb is recommended.

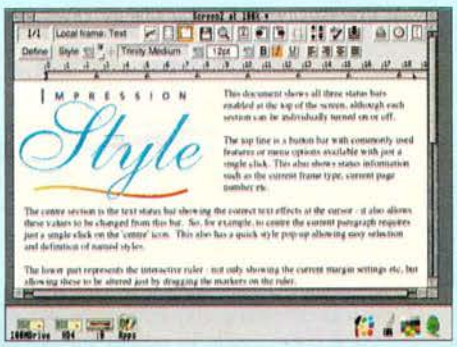
To make Impression easier to use, two forms of online help are available: Acorn's !Help and a full hypertext help.

Now you can see at a glance what all the controls and windows do as well as a comprehensive description of features. To find out more just double-click on the topic or keyword while you're using Impression Style.

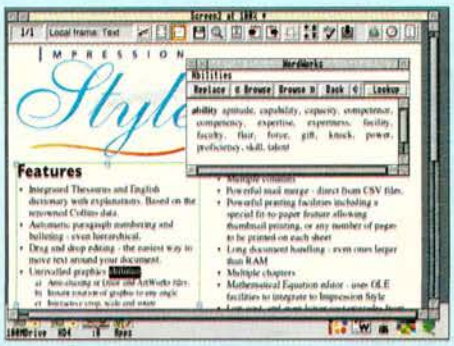
Drag and drop editing has now been implemented. Existing Impression users will notice some changes in the menus and keyboard shortcuts such as F3 for save and Control+A for select all.

However, this is in line with wider industry standards. The style menu has also been radically altered with a new three-stage ruler/information/button bar which can be configured to your way of working.

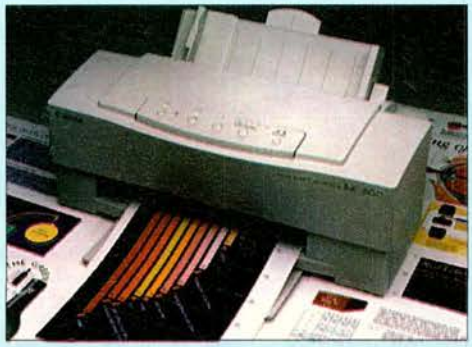
Impression Style lets you embed ➤



● *Impression Style's three-part status bars – the button bar along the top, the text status bar in the centre and the interactive ruler on the lower edge*



● *The pop-up WordWorks window showing a list of synonyms. Double-clicking the selection replaces it automatically in the main text*



● *The Canon BJC-600 four-colour 360 dpi printer. The colour cartridge keeps down costs and adds to its user friendliness*

● *A CD-Rom full of ArtWorks clip art for you to use or adapt to your own requirements*

● *Impression Publisher: Desktop publishing aimed at the professional user*

➤ graphics into text or place them anywhere on a page as well as incorporating a brand new feature – OLE (Object Linking and Embedding). If you want to edit an embedded object such as a table, you simply double-click on it and the appropriate application loads up and you can edit it using that package. Saving loads the data back into the frame in Impression.

At present Draw, ArtWorks and Equasor files – Equasor is bundled with both Style and Publisher – are supported, with plans for TableMate, set for a future release, leading to other logical extensions such as Eureka or any package which can use Draw-like files as a shell.

Another important addition is the *global clipboard* such as used in Advance and DataPower. This means that you can cut and paste from any application using the system to Impression and back again, without having to drag files between the applications.

Not for sale at the show but promised by Christmas is Impression Publisher – and the OPI supplement adding an Open Pre-press Interface and EPS (Encapsulated PostScript) support.

Priced at £169 with a supplement upgrade price of £230, this is the next stage in the development of Impression II and the enhanced DTP features aim to satisfy professional users with features such as automatic tracking and kerning, full colour separation support for 24-bit RGB and 32-bit CMYK, page bleed control and crop marks.

One of the most noticeable of the new features is the ability to flow text around irregular shapes by adding any number of points to frames.

The new 24-bit format for sprites has been finalised by Acorn and both new Impressions support this. This means that even if you only have an 8-bit display you can still manipulate and print 24-bit images.

Loaders are being written so that PhotoCD and JPEG files can be loaded and displayed in Impression. These can be added to by third parties.

Also at the show will be a CD-Rom version of ArtWorks, including a huge collection of clip art and fonts, and a second clip-art CD. New addition to the stable will be !AudioWorks which lets you edit and process sampled audio files in various forms.

This is a complete suite of sound editing functions for £49 and complements WildVision's Eagle multimedia card.

AudioWorks is compatible with a whole range of sound files whether they come from Acorn, PC or Amiga sources. An instantaneous zoom function is included, as is the ability to cut and paste parts of a sample with a utility for playing back from hard disk in the background.

As you'd expect, you can add various effects such as echo, reverse echo, amplify, wave form centering, ramp, pitch and amplitude bending, high and low pass filtering, re-sampling and so on.

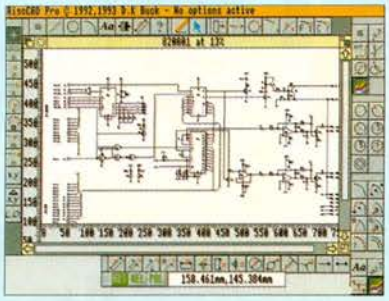
Computer Concepts will also be launching their new colour printer which features four colour 360dpi output with a special 24-bit TurboDriver. The Canon BJC-600 gives some very impressive results.

One of its most useful features is the ink system which has separate cartridges for each colour which you can change mid-print without any drop in quality. The price will be around £500 but you will need 4Mb ram and RISC OS 3.1.

● *ArtWorks on CD-Rom means oodles of clip art*

Davyn Computer Services

Stand 30a



● *RISCCad mixes ease of use with complex options and construction facilities*

RISCCAD Junior has been updated and renamed RISCCad Professional priced at £169.36 and is on display for the first time at the show.

An upgrade route is available for registered users.

This new version contains tool boxes, on-screen rulers and a host of new tools for trim lines, break object, automatic fillet and chamfer.

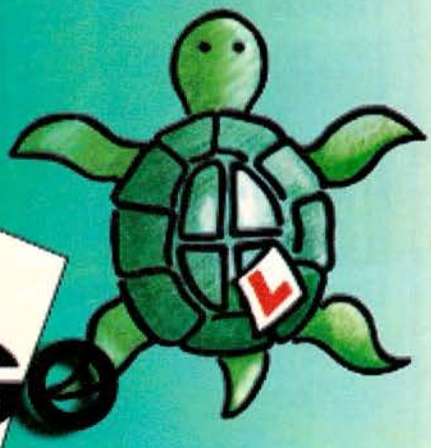
In addition there are polar and rectangular arrays and programmable plotter drivers. A raw data dump facility has been added, as has the ability enter data in any units.

RISCCad will work happily on a 1Mb machine needing only 360k including all the program code to output the drawing to a printer or plotter.

Davyn Computer Services (0924 254800) will be demonstrating both educational and business situations.

A Beginner's Guide to Logo...

FIRST LOGO



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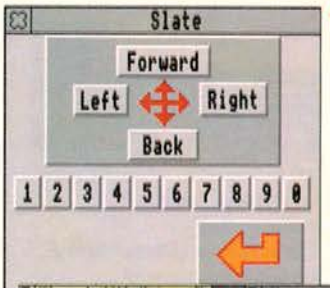
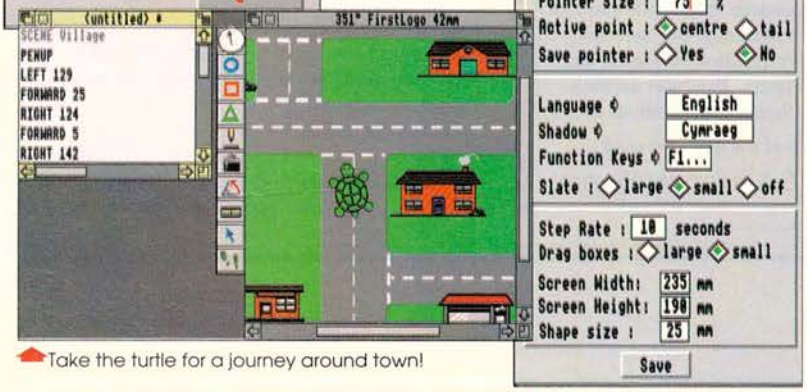
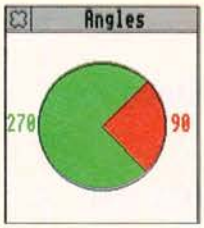


Slates allow easy entry of commands, simply by clicking



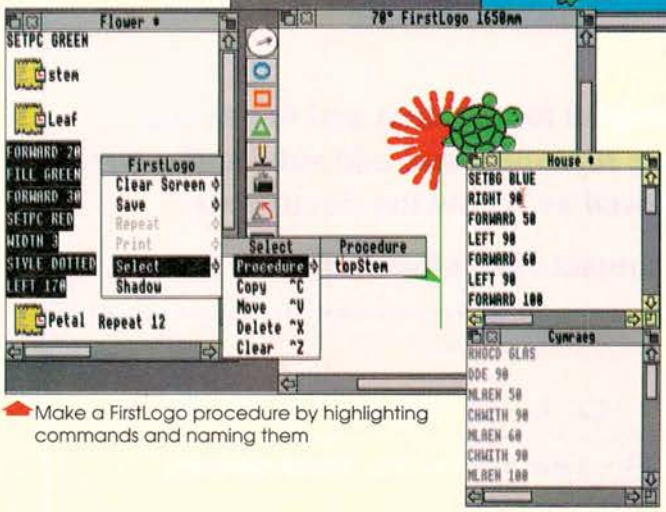
Take the turtle for a journey around town!

A large range of options make FirstLogo easy to configure for specific needs



Just point and click to measure an angle or distance

There are many exciting activities to try, such as this UK based map activity



FirstLogo commands can be entered in English, French or Welsh

Make a FirstLogo procedure by highlighting commands and naming them

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For further details please contact the sales department at:

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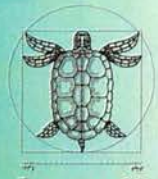

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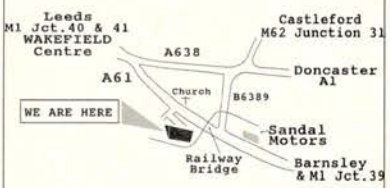

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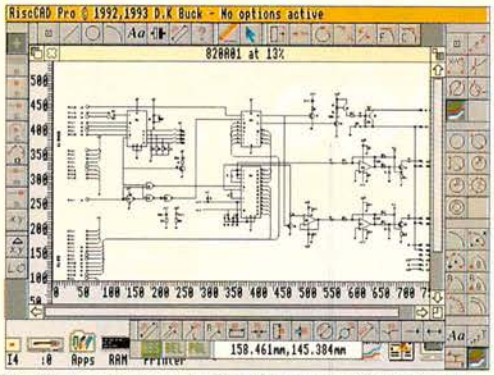

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ESP

Stand 93

MOVING on to the hardware side you can add sound to your life with the SSES – Super Sound Expansion System from ESP (0602 295079). Sold as an expansion card it combines a synthesiser, playback facility and Midi interface for £249.

It has been designed as a dual card so that future extensions, such as analogue to digital recording at a range of frequencies and resolutions, as well as digital-to-digital and direct-to-disk recording, can be added inexpensively .

At present the hardware gives you a 32-channel 16-bit synthesiser with 128 instruments and 49 percussion General Midi sounds in 4Mb rom.

Playback is 16-bit CD quality and the standard Midi interface lets you connect to any external Midi equipment. External amplification is needed and a range of speakers will be on display at the show.

ESP's software supports Replay as well as being able to play back samples from the command line.

A RISC OS Midi file and sample playback facilities are also included as are a range of files for you to experiment with.

Rather than replace the built-in sound system, ESP have made the SSES Midi-compatible so that existing Midi sequencers and composition programs can play directly to it.

4Mation

Stand 119

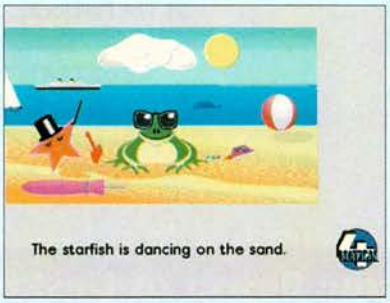
AT THE same time as Granny's Garden makes it to CD-Rom – available from Cumana Stand 41a for £34 – 4Mation (0271 25353) have adapted its authoring system to produce Explore with Flossy the Frog.

It's a truly interactive adventure ideal for children under eight. Just click on the pictures to make the adventure unfold.

Click on the star and you'll embark on a space adventure, click on the tap and you'll spend a day at the beach. Pay special attention to the star-struck starfish and the gull who thinks he's a boat.

There is also a lake and Flossy's home to explore, where animations and text are fun and thought provoking whether used at home or school. The sound effects and music give the finishing touches.

The program requires 2Mb ram minimum and costs £28.79 inc VAT.



● *A day at the beach is one of Flossy's explorations*

Irlam Instruments

Stand 121

THIS will be the first showing of Replay Plus and a limited number of these upgrades will be available from the stand. It consists of a hardware upgrade improving the image quality of movies captured by the Acorn Replay DIY kit and complementary software.

Several new features include time lapse recording, improved movie editing, better sound and new movie formats are now catered for as well. These formats take less disk space and can be played back immediately for storyboard use and so on.

Facilities for sound sampling allow the kit to be used as a high quality direct to disk stereo sound sampler with samples ➤

● *This reminds me of something...*

● *There are a limited number of upgrades at the show*

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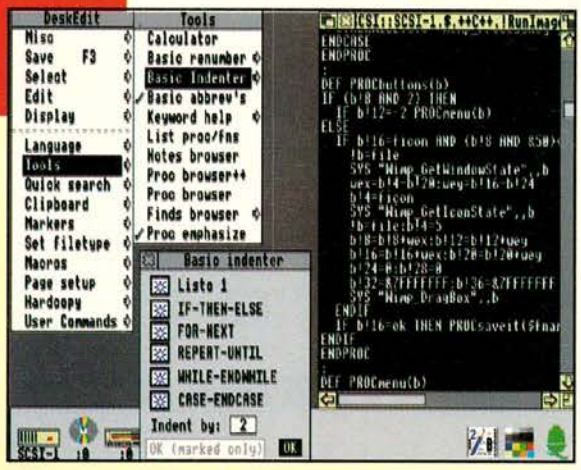
Harness the Power of Desktop Basic and C with DeskEdit 2

DeskEdit 2 is an exceptionally powerful desktop editor for Basic programs and C source code - but it is also very easy to use.



- Just open a window and type in your program. Press F3 to save it at any time. Press Ctrl-Shift-F3 and your Basic program will be saved and run interactively from within the Desktop - and if the name of the program is !RunImage then DeskEdit will run the parent application - Magic!
- If you are using line numbers, these are automatically handled for you.
- All Basic's abbreviations are automatically implemented.
- DeskEdit provides all the search and replace options of Edit plus some very special ones: DeskEdit's *QuickSearch* can take its target from any marked text (to avoid typing), and you can specify that it will only find matches in PROC and FN definitions.
- Special Browsers instantly build up scrollable lists of all defined procedures and functions.
- DeskEdit contains more than 100 special key combinations.
- A fully customisable Basic Indenter will format selected portions of your program.
- An Undo feature lets you Undo and Redo your editing, and this together with all markers and many other features is optionally saved to disc when you save a program.
- A customisable Help facility gives syntax Help on all Basic key words. A *Caret info* feature gives information about the character at the caret; and a file information feature gives you information on any file dragged to DeskEdit's icon when Alt is pressed.
- There are numerous markers and position finder features which make scrolling through your program to find a particular line a thing of the past.
- Plus Backup saves, special delete and tabbing options, a programmer's calculator which can import and export data, a flexible clipboard, powerful printout features, fully customisable user commands, powerful macros etc.

Archimedes World's feature on programming editors (August1993) says of DeskEdit 2:

"With so many features . . . . . this is an excellent choice of editor for anyone who programs. . . . . The whole feel of this product is one of utter professionalism."

*and it's review of DeskEdit 2 (February 1993) awarded a maximum score of 5 out of 5 in all four of its categories - **performance, features,value for money, overall.***

Moreover, DeskEdit is just as at-home with text (for editing Obey files, writing letters, or complete books), and with the C language, providing most of the features offered to Basic users (where applicable) with others added - including a syntax checker.

DeskEdit comes with:

- **fully illustrated 70 page manual (*with index*)**
- **function keystrip**
- **smart quick reference card**
- **freebies, including a desktop dustbin and Acorn's multi-file Find application.**

Stock Code: ***PDE2b***
Price: ***£26.95 inc VAT***
Upgrade: ***£9.95 inc VAT*** *(Code* ***PDEXb****)*

RISC Developments Ltd

117 Hatfield Road, St Albans, Herts AL1 4JS. Tel. 0727 840303 Fax 0727 860263

➤

created in Armadeus, Microsoft Wave, Creative VOC (SoundBlaster) formats and also direct to sound only Replay files. Replay Plus costs £139.

This year's show seems to be concentrating on the sound side of multimedia and not to be left out, Irlam (0895 8114010) will be demonstrating a new professional sound sampling card which records direct to disk. It will capture 16-bit stereo samples and play back at a higher fidelity than the standard Acorn system.

The same card has been used by CD-Rom application developers for some time but the hardware has been redesigned and prices cut to £299. Samples can be edited and saved in RISC OS or industry-standard formats. In addition, a powerful digital signal processor can perform real-time audio effects and compression.

Longman Logotron

Stand 72

S-BASE has undergone further development since its initial launch and the show will see version 2 made public. This one makes an excellent development tool for CD-based applications where you need to prototype data-heavy programs.

The philosophy behind the program is that it should be usable by non-programmers. If you are familiar with the first release you'll notice the new front-end called SAM – S-Base Application Manager – which is a logical progression letting you create a truly RISC OS database application just by pointing, clicking and dragging – no programming is required as SAM does it for you.

Query by example has also been included in this version and the developer version offers you the ability to drag and drop and import dBase II and Squirrel data files. No programming is necessary to accept different datatypes as S-Base 2 recognises ArmMovie, PostScript and so on.

One feature which has recently been developed independently by a number of software houses is the incorporation of online help in addition to support for Acorn's !Help.

This hypertext-like application is a useful feature common to PC Windows applications. It's good to see the idea implemented on the 32-bit machines.

The long-awaited PIMS – the primary version of SIMS – has been created in S-Base and should be available on Longman's (0223 42558) stand. PIMS has been on trial in schools for over a year and from the little seen so far has a high-quality report print feature.

If you want to see what can be created with S-Base, Resource Manager comes with the new version which is both a good demonstration of S-Base's capabilities as well as a very useful application in its own right.

The program lets you file any kind of document from Impression documents, to sprites and movies. You can run or load things from it as well as read information on the file structure itself.

Also not to be missed is CD Resources – a must for teachers. This CD-Rom contains 4,000 slides from microscopes, research labs and NASA which can be used in any application you want.

Oak Solutions

Stand 81

THE most surprising thing about morphing packages is that they have only just made their debut on Acorn machines. Rephorm is a product of Ace and Oak's (0954 211760) experience and collaboration and costs £49.95.

It is intuitive to use and the instant *thumbnail* morph feature gives you an immediate idea of what you have created. Most options are controlled via self-explanatory buttons and the zooming is very useful especially when adding control points around detailed areas.

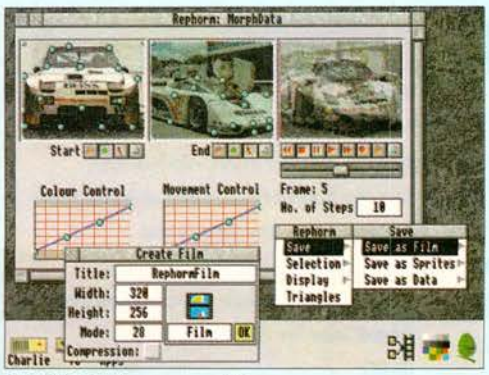
A Triangle option lets you warp either or both pictures and there is also a facility to add a static background to your morph.

Colour and movement are changed separately via two graphs and modifications are applied to all the selected control points on the sprites. Experimentation is encouraged and allows even the least inexperienced user to create an effect.

A particularly useful feature is that if you develop a good effect using control points and colour and movement controls you can apply this to different sprites simply by dropping them into the frames regardless of sprite size or mode.

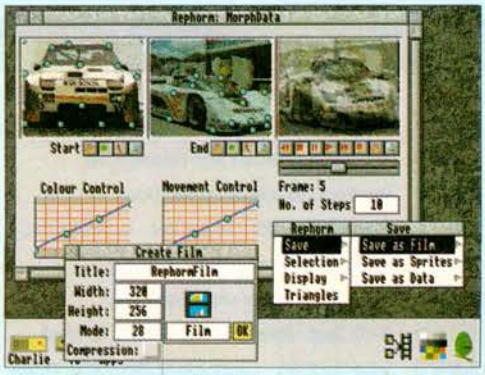
This is because information about control points is held relative to the size of the sprite not absolutely. Sprites – end or intermediate – are automatically converted internally to 8-bit per pixel images.

Rephorm is easy to use and experiment with and you can save your results as sprites, Ace films or as Rephorm files. You can also add fades and wipes to distortions and transformations.



● *With Rephorm everything you need is in the one window*

● *You can add any backgrounds you like to morphs*



● *The Triangles feature lets you warp creations without a destination sprite*

Risc Developments

Stand 77

PROGRAMMERS should pay a visit to Risc (0727 840303) where they can find the Basic Programmer's Toolkit. This is a collection of 10 applications which are especially useful if you're struggling with Basic. If C is more your forte, Easy C will also be available for £49.

This consists of an easy-to-use Wimp front end to drive the compiler and linker so avoiding complicated command-line sequences. A good introduction to C, the compiler is capable of handling substantial programs supporting the *throwback* mechanism where errors are passed automatically to a text editor.

Risc will also have their high-density floppy drive interface and drives for older Acorn machines giving access to 1.6Mb capacity Acorndisks as well as 720k and 1.4Mb Dos disks for around £150.

Those who need a tape streamer should take at look at a new low-price model which connects to a standard printer port.

Wild Vision

Stand 68

PARTNERS with Computer Concepts – the two companies are sharing stands – Wild Vision's (091-519 1455) major release will be the Eagle M2 expansion card which promises to *do everything* for anyone involved in multimedia.

As well as video digitising still images and Replay movies there is stereo audio sampling and playback as well as Midi connection. Four software packages support the package including a video viewfinder, image capture utility – allowing Replay movie generation and compression, the existing !ARMovie and Computer Concept's AudioWorks.

Following advances in digital television techniques Wild Vision have been able to incorporate real-time hardware scaling and dithering of digitised images which are clear down to the size of a postage stamp.

Internal and external versions are available as long as you have RISC OS 3.1 and 4Mb ram.

Staying with the avian theme is Lark, a high-quality 16-bit audio sound sampler. It connects to external hi-fi and CD-Rom equipment as well as to the 32-bit internal sound facilities. You can also fit a microphone to a stereo hi-fi amplifier, active speakers and other audio equipment such as graphic equalisers.

The card can sample and playback sound up to 48KHz with samples stored in 16-bit linear format compatible with the existing VIDC system, while filters enhance the VIDC playback capabilities.

Also look out for the Chroma 500 digital genlock card which builds on the ColourCard technology offering higher resolution screen modes, crisper graphics and the ability to encode S-VHS.

Wyddfa Software

Stand 94

● *As you work with Talking Stories a tale appears*

DO YOU know the English for *yr Wyddfa*? If you do you could win £50 of software, hardware or books from Wyddfa (0286 870101).

However, while you're contemplating the entry form listen to Talking Stories. This is aimed to help pre-reading children to read and write and as they progress it builds up into a lively story.

The screen is divided into three containing a picture, one or two columns of words and room for a sentence. At the earliest levels a child is given a simple question about a picture such as *What colour is John's spade?* and the correct word is chosen from the words column.

All the questions end in an amusing story. The difficulty can be modified by letting a child listen to the question and to the answers.

As the child progresses the challenge increases to a page featuring a picture and sentence with a word or phrase missing which they must complete.

Acorn World Theatre schedule

	Friday	Saturday	Sunday
11.00-11.30	Networking in the Wide World – Jo Magnani (Acorn) and Lalit Nathwani (Novell)	Taking Better Photos with Photo-CD in Mind –Joe Partridge (Kodak)	Beginners Start Here – Garry Neale (Acorn)
11.40-12.10	Publishing for Professionals – Simon Woodward (Acorn)	Producing a Pop CD – Stewart Palmer (Acorn)	Why Buy a Pocket Book for my Child? – Dick Wallin (Acorn)
12.20-12.50	Open Access: Special Needs –Dick Wallin (Acorn)	Governors Start Here – Dick Wallin (Acorn)	Taking Better Photos with Photo-CD in Mind – Joe Partridge (Kodak)
13.00-13.30	Taking Better Photos with Photo-CD in Mind – Joe Partridge (Kodak)	Photo Retouching – Simon Woodward (Acorn)	Publishing Magazines – Robert Marriot (Redwood)
13.40-14.10	The Electronic Prospectus – Stewart Palmer (Acorn)	From Archimedes to Archimedes – S. Roberts and D. Patten (The Science Museum)	Education Down Under – Greg Sebire (Acorn Australia)
14.20-14.50	ARM – Powering the Vision – Jamie Urquart (ARM)	Preparing Material for Publishing Bureaux – Tony Tolver (T-J Reproductions)	Multimedia: A solution searching for a problem – Stewart Palmer (Acorn)
15.00-15.30	Graphic Design – Alastair Wells (Netherhall School, Cambridge)	Educational Software on CD – Roger Broadie (Acorn)	Technical Question Time – David Bell (Acorn)
15.40-16.10	School Administration – Graham Lockwood (Murrow School, Wisbech)	A Truly Personal Computer – Mike Wood (Psion)	CLOSED
16.20-17.00	Technical Question Time – David Bell (Acorn)	Technical Question Time – David Bell (Acorn)	CLOSED

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The **Revolution** matches the capabilities of far more expensive drives. It is Replay, multisession and Kodak Photo CD compatible, operates via Acorn's CDFS and is compatible with existing hardware running RISC OS 3. It can also use all available RISC OS based CD-ROMs, as well as access DOS based discs and run them through emulation. It even plays audio CDs!

Contact us for more details about the Morley **Revolution** CD-ROM or place your order and join the **Revolution** now.

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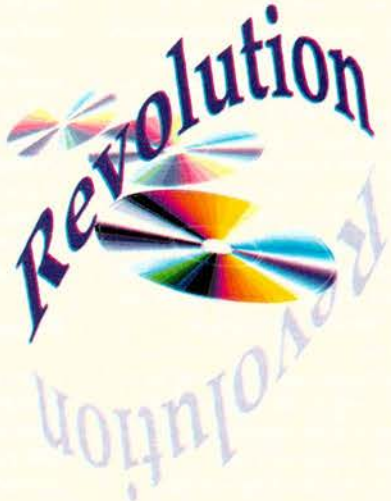

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Facelift or transplant?

Geoff Gallacher takes a look at an A3000 transformation

WHEN I first heard about this new product, I did not believe it was possible. But Greyhound have managed to design and build an internal expansion upgrade board which allows you to add, to your A3000, high density (1.6Mb) drives, an IDE hard drive internally, a bi-directional parallel port and a second serial port.

The way in which this achieved is really quite innovative and provides the complete upgrade in a simple set of steps. The basic kit provides a new high density floppy disk drive, a special floppy disk drive bracket and the Multi I/O Primary Expansion Board.

To fit the unit, you simply need to unscrew the existing floppy drive and put the new bracket and high density drive in its place and fit the expansion card.

The reason there is a special bracket is that the floppy drive is half the height of the standard A3000 drive – only half an inch high – and allows space underneath the new drive to fit one of those neat little 2.5in IDE hard disks. The expansion card fits to the internal slot of your machine.

The second stage comprises the hard disk upgrade kit and includes a 2.5in drive, a connecting cable, external power supply – nice touch that – and a logic chip which must be plugged into the board to let the software know a hard disk is connected.

As with stage one you have to fit the hard drive to the floppy disk bracket with four screws and re-fit this to the machine. Once connected, the drive functions exactly like any ADFS-based IDE hard drive under the new HDFS software. The drive supplied with my review copy was a Conner Peripherals one – the same make Acorn use in the A3020, A4 and A5000 machines.

The third stage is a secondary board upgrade kit and is another PCB which plugs into the main board and provides a bi-directional parallel printer port and a 100 per cent Acorn compatible serial port.

To fit this to the primary board you have to remove the card from the machine, unscrew the backplate, fit the new board to the connector and finally connect its new backplate on to the primary card.

This took about 10 minutes. Reference to the manual wasn't really necessary, but I did check that nothing else needed doing before reassembling the machine and switching on the power.

The final stage is the User Port Upgrade kit which is still in its prototype form. I'm told it consists of a small board, very similar to the secondary board, but provides a User Port and will be retro-fitted to the standard product.

PRODUCT SPOTLIGHT

Product: A3000 Multi I/O Expansion Card
Price: £199 (not including VAT)
Supplier: Greyhound Marketing, 376 Meanwood Road, Leeds.
Tel: 0532 621111
Requirements: A3000 with RISC OS 3.1

Proof of the pudding

I was given the first three stages of the Multi-I/O Expansion board: A high density floppy disk, an 85Mb IDE hard drive, bi-directional parallel port and second serial port.

In effect, totally upgrading everything in the A3000 apart from the memory, processor, power supply and keyboard – an outstanding achievement in anyone's book, but you must have RISC OS 3.1 fitted for this upgrade to work properly.

The manual is well presented and includes pictorial diagrams of all the various combinations in a clear and concise manner.

When the machine first boots up after configuration, the floppy drive spins for a second or so – just like the A5000. On the iconbar are standard looking ADFS hard and floppy disk icons. The hard disk icon has the name I gave my hard disk and the floppy has the abbreviation :0 HD to signify that the drive is high density.

Putting a high density ADFS disk in the floppy drive and clicking on the icon opens the usual directory viewer on screen but this is now being driven from the new board and is controlled by a module with the prefix HDFS – High Density Filing System.

The education marketplace will also be interested in the Multi I/O board as one problem they have with the new machines is that they cannot make full use of 1.6Mb.

If they have a mix of old A3000 and new A3020/A4000 machines, all the data has to be on 800k disks so it will work on any machine in the school. The Multi I/O board should cure this with the stage one portion of the upgrade.

The IDE hard drive is powered by a heavy duty external power supply which barely got warm after 12 hours of running. This is a considerable improvement over some of the internal IDE drives in the market today and won't stress or overheat your A3000 power supply – so shortening its life.

The current software doesn't have facilities to spin-down, as the A4 does, but with the external power supply running so cool, it isn't really necessary. Greyhound have

said that this could be added if enough users request it taking the the form of a user-fittable rom upgrade.

A little extra feature which they have included in the current version is that they use the floppy disk light to indicate activity on the hard disk. This is very reassuring and manifests itself as a fast flicker of the floppy disk light as opposed to a floppy access which lights the LED for a much longer period.

If you have other drives connected to the A3000 motherboard socket, this facility is automatically switched off and the system reverts to normal.

This means that you could have your second floppy drive mounted externally to the system and still be able to use both drives, or with a disk buffer fitted up to a total of six drives – four 800k on the ADFS motherboard A3000 connector and two high density 1.6Mb drives on HDFS and Multi I/O board.

The bi-directional parallel printer port is easy to set up as a standard printer port, and due to the 100 per cent compatibility of the software, it can be controlled by !Printers. This leaves the main A3000 printer port available for joysticks, dongles and so on.

To print to the new parallel port, you simply need to set up your printer driver to print to File and type *Parallel2* in the filename box. When you drop something on the printer icon, it will output exactly as though the printer was connected to the standard port. But, the real advantage of the bi-directional parallel port, is that it can be used to transfer data to and from other computers.

Some companies are currently working on external hard disks, scanners and tape streamers which connect to bi-directional parallel ports and this is another use for this port in the near future.

The second serial port is also 100 per cent Acorn compatible and is supported through DeviceFS. This means it can be used for machine-to-machine file transfer, modems, serial printers and industrial control in the same way as the normal serial port.

It is accessed via the name *Serial2:* and it will probably be the least used of the interfaces on the Multi I/O board, but it does work effectively should the need arise.

Faultless

During the time in which I was using the system – fitted to my A3000 with 2Mb of ram – I never once had a crash or anything nasty happen, unlike some other products I have worked with in the past.

The high-density drive formatted and copied over 50 disks, without fault, and all were readable on my A5000. The hard disk performed flawlessly and no bad sectors or unrecoverable file error messages could be produced.

I used the parallel port to do a backup of my 40Mb A5000 disk to the 85Mb drive and this was performed numerous times without failure. Printing from the new parallel port and from the serial port was also successful – even printing to both parallel ports simultaneously worked successfully.

Comparing the speed of operation of the A3000 with Multi I/O hard disk to the A3020 IDE hard disk, gave surprisingly good results. The A3020 was faster at transferring files from memory to disk, but this was to be expected as the memory and processor in an A3020 runs one and a half times as fast as the A3000.

A small proportion of the theoretical maximum transfer rate across the podule bus is sacrificed for Acorn compatibility and in my opinion this is a good thing, as 100 per cent compatibility is much much more important than squeezing the last drop of speed out of the system and ending up with an incompatible system.

To check the compatibility, I built a ribbon cable assembly to connect the drive to my A5000. I could read and write to the hard disk without any problems.

This opens up the possibility of having a 2.5in removable hard drive – an interesting prospect because if my machine broke down, I could simply plug my drive into the A5000 and carry on.

● *The extra ports are easily accessible*

● *The new disk drive is thinner...*

...giving extra space for the hard drive

Summing up

Well, what more can I say? If you have an A3000 the Multi I/O board is definitely one product which lives up to its name. Extreme attention to detail and 100 per cent Acorn compatibility were obviously incorporated to provide the ultimate in A3000 internal expansion.

The external power supply is, I believe, a first for internal drives and it is quite a relief that Greyhound include this with the hard disk upgrade. As the new range of Acorn machines are all fitted with high density drives it is inevitable that software houses will start supplying software on high-density disks – Acorn already do with 3.10 upgrades for the A5000.

If you want more features than this board provides, you will have to wait a very long time indeed. If not, your A3000 plus the Multi I/O board is the best upgrade I have ever seen and is excellent value for money. Even if you don't want the hard disk just think, only half the number of floppies to swap. For marks out of 10 this system would score 12.

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CD technology for all. . .

WITH multimedia rapidly evolving and the advent of PhotoCD, the future looks rosy for CD-Rom, but is it? The main problem with CD-Rom concept, in the Acorn market, is that the components are expensive both for hardware and software.

As players tend to be SCSI devices, there is the cost of the interface to consider. Even with the advent of cheaper SCSI interfaces from Cumana, Atomwide and HCCS, you still won't get much change out of £500 for a fast CD-Rom system, until now.

Until now the cost of CD-Rom hardware has proved a sticking point – our team investigates

Cumana's choice – hard to beat

CUMANA are the undisputed leaders in the Acorn CD-Rom marketplace and have put together an attractive package which aims to reduce costs and provide greater accessibility to the exciting world of multimedia.

Called the Single Low Cost Drive – SLCD for short – the system does away with SCSI altogether and offers a new interface to which can be connected one 300 series CD-Rom player.

To clarify the situation, Cumana have replaced their existing 400 and 500 series players with the newer 300 series (SLCD) and the 600 series – a high speed SCSI device which has a higher specification.

The 600 series drive costs more but offers superior performance and I would anticipate its suitability for sustained use on, say, a network or in the library where many people may want access at the same time.

The SLCD system utilises its own low-cost interface which is already available as a micro-podule for installation on Cumana's EMU – for A3000 series and A4000 – and single podules for all other A-series machines. Like the 600 series these players are housed in sturdy metal cases with a moulded power plug and a power switch on the front for easy access.

In use the unit performed faultlessly throughout the review period during which time I ran a range of multimedia CD-Roms like Space Encyclopedia, Creepy Crawlies and Acorn's Replay demos.

SLCD coexists happily with SCSI and other interfaces behaving simply as alternative, discrete, filing system. Cumana are packaging the SLCD system with a variety of CD-Roms which should appeal to both families and educationalists alike – some of the best titles are included, heavily discounted.

If you are looking for a CD-Rom player for the classroom, small business or home use the SLCD/300 series system is hard to beat offering as it does all the advantages of CD-Rom technology – full motion video, stereo sound, graphics and music – at a substantially lower cost.

Chris Drage

● *Ideal for personal use*

● *The 600 series will stand a great deal of use*

Technical specifications of the 300 and 600 series

	300 Series CD-Rom Player	600 Series CD-Rom Player
Access time	320 milliseconds	295 milliseconds
Multisession PhotoCD	yes	yes
Buffer size	64k	256k
Audio Playback (stereo)	yes	yes
Loading method	tray	caddy
Interface type	SLCD	SCSI
Expandable	no	yes
Suitable for	Acorn A-series, PCs	Acorn A-series, PCs, RM Nimbus, Apple

PRODUCT SPOTLIGHT

Product: SLCD CD-Rom Player
Price: £299 (drive only), £399 (including SLCD interface)
Product: 600 Series CD-Rom Player
Price: £429 (player only), £524 (including SCSI interface)
Supplier: Cumana, Pines Trading Estate, Broad Street, Guildford, Surrey GU3 3BH.

Morley Revolution – A turn up for the books

THE Morley Revolution was designed with the criteria of being low-cost, easy to fit and be instantly usable and it seems to fit those requirements very well.

The whole system comes in one box with the interface card – whichever is appropriate for your machine – and drive, a specially-boxed PhotoCD-compatible Sony unit. You open up the computer, plug in the expansion card, put it back together and plug in the extra bits. Then switch on.

● *Morley's CD solution – easy to fit and inexpensive*

The iconbar gets the CD-Rom drive icon at the far left and you then configure the number of drives connected and the size of buffer you want to use. The default value of 16k is adequate but if you've got pots of memory you might improve performance by increasing it.

This software is the standard Acorn CDFS so it works just like any other CD-Rom system on the 32-bit machines with no compatibility problems. The manual gives a clear description of how to configure the PC-Soft emulation system to use the CD-Rom drive as well.

As with other Morley CD-Rom options a floppy disk is supplied with a couple of utilities. One of these is !CDPlayer which allows you to control playing an audio CD – it's like having a remote control for a CD player. Another utility is !ChangeFSI, which can be used to convert pictures in alien formats into Acorn sprite files.

This is useful if you get your hands on a PC CD-Rom, as the system will read them – as will all CD-Rom drives – but the data isn't always meaningful.

If you want a CD-Rom and don't care about an SCSI interface, this is probably the option for you. But if you're using the A3000 series or A4000 it does bar any further hardware expansion because it uses the mini-podule slot.

Steve Turnbull

PRODUCT SPOTLIGHT

Product: Revolution
Price: £299
Supplier: Morley Electronics Ltd., Morley House, West Chirton, North Shields, Tyne & Wear NE29 7TY.
Tel: 091-257 6355

The Atomwide reply – Low-cost SCSI interfaces

ATOMWIDE have recently launched a novel pair of SCSI interfaces for Acorn 32-bit computers which interface via the parallel printer port. This makes the SCSI interface easily portable between machines and, indeed, makes possible the connection of SCSI devices to the A4 portable.

The units require a bi-directional parallel port and will therefore work on the A5000, A4, A3010, A3020 and A4000 machines. Two versions of the SCSI interface are available: Mono/SCSI and Printer/SCSI.

● *A cost-effective SCSI solution*

The Mono/SCSI adapter is supplied in a small case the size of an Impression or Artworks dongle. One end connects to the parallel port, the other to an SCSI device – or number of SCSI devices – via a suitable cable, which is included. This is powered from the device being driven so there is no extra draw on the computer's power supply.

One application, !BootSCSI, is supplied which loads the various modules required when run. A full implementation of Acorn's SCSIFS and CDFS are included so compatibility with the Acorn standard is ensured.

You can plug in any SCSI CD-Rom drive and it will work without difficulty. In use, the transfer rate achieved is lower than an internal card – about 200k/sec maximum – due to the limitations of the parallel port as a high-speed interface.

The only real drawback with the Mono/SCSI adapter is that it blocks the parallel printer port.

The Printer/SCSI interface is identical to the Mono/SCSI apart from the inclusion of a printer pass through socket from the parallel port. Physically the device is a little longer, to allow an extra connector to be added to one side for SCSI – the printer connects to the rear of the adapter.

The Printer/SCSI adapter works fine with Computer Concepts' dongles for Artworks and Impression, and with their range of TurboDrivers. If you happen to have all three products fitted to your machine – over seven inches – a *dongle-dangler* can be used to reduce the length of this appendage.

The interfaces are ideal for those who need to move a SCSI device between machines, those with A4s, and those who have a requirement for a SCSI interface which does not occupy a valuable internal expansion slot.

Rob Miller

PRODUCT SPOTLIGHT

Product: Mono/SCSI
Price: £49
Product: Printer/SCSI
Price: £75
Supplier: Atomwide Ltd, 7 The Metro Centre, Bridge Road, Orpington, Kent BR5 2BE.
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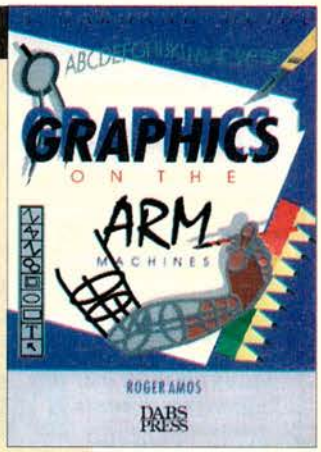
Off the bookshelf

Clem Vogler sits down to bone up on both graphics and DTP

Graphics on the ARM machines

By Roger Amos



THERE is no topic on Archimedes applications more in need of illumination than graphics and this book fills a much needed gap. A useful introductory chapter carefully distinguishes between vector and pixel graphics and, if you are not sure what the difference is, this book is required reading.

It provides a good balance between explaining graphics principles and describing the capabilities of a range of current software packages including Draw, Paint, Artworks, Revelation, Fontasy, Vector, PowerShade, Euclid, Render-Bender and many others.

As well as summarising their main features, Roger Amos explains what structural features make a specific package good or bad for a particular application.

Image processing software, like ChangeFSI, is to be found on a good many iconbars, where it usually sits passively mystifying its owners. The book throws welcome light on this and other arcane topics like ray-tracing and Mandelbrot sets – though the treatment is completely non-mathematical.

Much has been written in this magazine about the shortcomings of Acorn's colour display capability and I was disappointed that discussion of this live issue was relegated to a rather perfunctory appendix. You could argue that it is a rather technical area of limited interest to 32-bit users who want to make the best of the machine they already have.

I have one or two minor theoretical disagreements with the author, such as when he says that there are two sorts of dither pattern – there are hundreds – but I was pleased that he conformed to my preferred definition of a pixel as the smallest display element you can individually turn on or off.

I would have welcomed a fuller discussion of colour printing as there must be many readers contemplating the merits of buying a colour printer and most are one bit per pixel per colour machines and the limitations this imposes are frequently misunderstood.

In general, though, I thought Roger Amos did a good job of maintaining technical accuracy without becoming technical.

With such a big subject there will inevitably be omissions and I did not have the comforting feeling I got from Anne Rooney's Impression Guide that I was being told everything.

Certainly this book does a good job of setting much useful and interesting information into a logical context. Like the other Dabs Press book, this is attractively produced with copious illustrations and 16 well chosen colour plates.

PRODUCT SPOTLIGHT

Price: £14.95
ISBN: 1 870336 130
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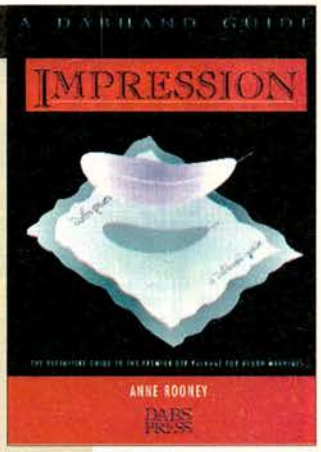
Tel: 0772 623000

Impression

By Anne Rooney



IF you use Impression regularly for wordprocessing and desktop publishing – as I do – you probably think you're pretty familiar with its features. Try this short test:

- What does Control+L do ?
- How can you add vertical rules?
- What does lock to linespace grid do?
- How can you force multi-column displays to line up across the page?

If your answer to these is a scornful, *yeah, easy* you can stop reading now as this new book on using Impression is unlikely to have much to offer. The rest of us should read on.

It's a curious fact that, while details of this sort are covered in the Impression manual, most people remain vague about them. The manual has grown with successive versions of Impression and its compilers have concentrated on cramming in references to all the features without sufficient regard for organisation.

By contrast, Anne Rooney's guide is an outstandingly good introduction and reference manual for one of the 32-bit machine's most illustrious software packages.

Anne Rooney's achievement is to organise the information in this book so systematically that you can read it from cover to cover without needing to refer back or forwards to related topics. Of course, it's pretty unusual to read a technical manual from cover to cover but experienced Impression users could slick-up their act by doing just that.

This book is delightfully readable as it seeks only to inform not to patronise or impress. Jargon is avoided unless first explained, as Anne Rooney prefers to use plain English enhanced by good grammar, word-usage and punctuation – old-fashioned virtues often ignored in the computer business.

Clarity is further aided by the layout of this Dabhand guide with its wide margins and comprehensive reproduction of screen displays.

Each chapter deals with a topic such as Frames or Master Pages. These are often menu items from Impression and I like the way the meat of each chapter is sandwiched between an introduction and a summary – the outer layers aiding understanding of new topics – but easily dispensed with when seeking clarification of a detail.

Unlike the official manual, this book has a useful discussion on the pros and cons of using Effects rather than Styles. My only quibble is that there is no separate list of keyboard short-cuts while the optional disk is a further aid well worth having.

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Polishing the family silver

What have Acorn got planned for you? Pam Turnbull investigates

ACORN have unleashed the power of their expanded range for the Show with the new A5000 clocking in at 33MHz, enough to give big selling 486DX PCs a run for their money.

Add to that whispers of a future 64-bit Acorn with 24-bit colour and lightening speed, coupled with the ARM 700 and 800 chips and Steve Furber's Amulet asynchonous ARM chip, it's clear Acorn's R&D's strengths continue to turn rivals green with envy.

For now, in addition to the new A5000, Acorn have attacked the traditional ground of the Amiga range with a new A3010 Action Pack bundle which includes five games including Zool and a WP package priced at £399. It's this package which spearheads Acorn's renewed attack on the Christmas peak selling season.

Present and future plans were unveiled by Acorn's Malcolm Bird and Mike O'Riordan at a pre-exhibition press conference at London's Planet Hollywood.

Acorn see themselves these days as *niche players* but that's where the money is and where exciting new technologies can be found.

Education is one of these niches giving homes to 300,000 32-bit Acorns in 27,000 schools, six million children using them every day while over 15 million have been exposed to Acorn machines over the years.

Faster expandability

Acorn have been promising no new machines but they have ramped up the clock speeds of the A5000 to 33MHz. The box is identical to existing A5000s which will still be on sale while stocks last but, inside, the serial number has changed and you can expand this new model to 8Mb ram more easily than before.

What you get is:

- 33MHz ARM 3 with 4k cache
- 2Mb ram/80Mb hard disk upgradeable to 8Mb (or can you opt for 4/162 model)
- RISC OS 3.11 in 2Mb rom
- Support for FPA (the faster one available in 1994)

plus all the usual A5000 features: High density floppy drive, bi-

➤

directional parallel port, serial port, 8-channel stereo and multiscan monitor.

Prices start at £1,275.74 plus VAT and network models are available for both Ethernet and Econet

Speed increase is reported to be around 30 per cent and this model also boasts the new ARM3 which has been made using the 0.8 micron process. This will also be used for the next version of the FPA due at the end of 1993 or early 1994.

Lovers of statistics will undoubtedly like to know that it does 16 MIPS and has a rating of 30,000 drystones. In PC terms the new A5000 is faster than a typical 33MHz 486DX.

● *Acorn's new marketing strategies...*

...will they work on the High Street?

Packaging power

Commodore's problems may well have encouraged Acorn to go for their market share this Christmas as can be seen with the Action Pack promotion. Acorn's approach is centered on the latest piece of jargon *edutainment* (educational entertainment) which promises to be the buzz word for 1994.

The Action Pack is priced at £399 including VAT – that's a reduction of 20 per cent for the 1Mb A3010 without monitor – and comes with five game titles plus Icon Technology's wordprocessor StartWrite. Zool is top banana while you can also try cut-down versions of Fervour, SuperPool, Chuck Rock and Lemmings.

Bundling continues with new versions of the Learning Curve packs from the 2Mb A3010 at £749 to the 4Mb A5000 with 160Mb hard drive at £1749. With the hardware comes Advance, PC Soft with DR DOS 6 and interactive demonstrations of 10 commercial education programs: Rhapsody II, ScoreDraw, VoxBox, Fervour, Topographer, Darryl the Dragon, smArt, Crystal Rain Forest, Naughty Stories and ArcVenture III.

Potential A4000 and A5000 buyers can opt for the Home Office pack with EasiWriter II, Datapower, Pipedream 4, PC Soft and demos of Prophet and Almanac. Retail prices start at £1099 for a 2Mb A4000 with 80Mb hard drive.

Acorn want to position their machines as the *educated choice for home computing* and to this end they are producing a free video featuring Blue Peter's John Lesley and the Jackson family.

Acorn's consumer general manager Richard Percy announced: "In the run up to Christmas many families will be considering a computer for the home.

Most are familiar with games consoles but when it comes to picking up a computer that will act as an interactive edutainment centre for the whole family the buying decision becomes more complex and daunting".

The idea is to present both the experienced and inexperienced with a buying checklist before they face the High Street. No prizes for guessing which computer comes out on top.

Video action

Another of the niches about to fall to Acorn is that of full-motion video and video editing with real-time Replay about to hit the market. Also poised to make an impact is Eidos launching Escape and Eidoscope. Both products are borne from Optima, a professional video editing system.

Escape compresses the size of a video by 350:1 without additional hardware and once compressed Eidoscope allows you to edit the video using all the features of the professional Optima used for TV programmes. More software is promised before the end of the year.

ARM 600 on Planet Hollywood

By the way, Planet Hollywood must be the *in place* for both Acorn and ARM as the latter were to be seen in the same venue a week later launching the excellent Newton – now that's what I call a notebook computer.

Using the ARM 610 you can plan your schedule and make notes just like you do with a pen and paper.

The technology is at its best if your handwriting is reasonable, you write slowly, leave good spaces between words and don't drag your ring fingers over the screen.

However, the OCR is much better than the first machines of this type I used some four years ago with about 80-90 per cent accuracy according to ARM's Robin Saxby.

You can configure the Newton to other people's writing styles and it learns from you as well as vice versa.

The ARM 610 was chosen because of its low power consumption, low cost and high speed. I wouldn't say the finished product was perfect but it's a viable electronic solution rather than just a gimmick.

The word processor for Acorn RISC computers

Impression Style is a new word processor combining the best points of all earlier word processors with many powerful features new to the Acorn platform. Impression Style is a word processor suited for all users - the occasional letter writer, student, small businessman or professional writer. It also incorporates many DTP features so that it can handle complex page layouts with ease.

Word Processing

Impression Style is a capable and very powerful product but it is also an extremely easy to use word processor. In order to make it simple to use, we have incorporated the very latest software technology, found on no other Acorn word processor, including two types of on-line help - interactive help and full hyper-text help. Not only can you tell at a glance what all the controls and menus do, there is comprehensive on-line documentation explaining the features. Simply double clicking on a topic or keyword will display an explanation - and of course you can do this on screen while using Impression Style.

IMPRESSION Style

It also offers drag and drop editing - the simplest, most intuitive way to edit documents. There is an integrated thesaurus and dictionary with definitions (another first for Acorn machines) both based on the highly respected Collins publications. Impression Style is the wordsmith's dream come true.

Modern word processing involves much more than creating and editing long text files - producing monospaced typewriter-like documents is often no longer acceptable. Therefore Impression Style offers page layout capabilities second only to the very best DTP packages and it does this without compromising the word processing abilities.

It allows graphics to be embedded into the text or placed anywhere on the page and includes another first for Acorn users - OLE or Object Linking and Embedding.

OLE EXPLAINED

If you want to edit the embedded object (this is usually a graphic, but it could be other data such as a table or equation) you simply double click on the data, which is then transferred directly to the appropriate editing application - for example !Draw. Once you've edited the graphic, simply closing the window will transfer the data directly back into Impression Style. This powerful technique couldn't be more convenient or easier to use.

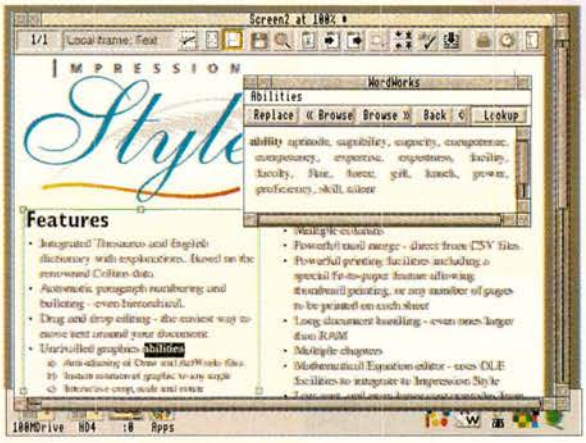

Illustration shows new button bar enabled at the top of the screen. This offers direct, instant access to commonly used functions such as saving, cut, copy, paste. One button is the new zoom tool which allows ArtWorks style drag-zoom into any region of the document.

It also shows a word selected in the text and the pop-up thesaurus window showing a list of synonyms. Note the smart selection of root word.

There isn't room to cover all aspects of Impression Style, but some other features include:

- Impression Junior, II, and Acorn Advance file compatibility.
- Integrated WordWorks thesaurus and dictionary.
- Automatic section and paragraph bulleting, numbering and re-numbering.
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All registered owners of Impression Junior and Impression II, can upgrade to the full version of Style, including dictionary/thesaurus, by quoting the registered serial number.
£29.00 + VAT (£34.07 incl.)

Existing Impression II owners can upgrade to Impression Style for £29.00 + VAT but a further upgrade to Impression Publisher, when it is released, will cost another £29.00 + VAT (£34.07 incl.)

Owners of other WP and DTP packages can also upgrade to Impression Style. Return the key/master/N° 1 disc of your existing package with £70.00 +VAT (£82.25 incl.)

* This offer is open to owners of the following packages: Wordz, Ovation, First Word Plus, TechWriter, Easi-Writer, StartWrite and Advance.

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Upwardly mobile

TAKE a look at the Applications Disks and you'll come across a program called !65Host. Not the most self-explanatory name in the world but it stands for the 6502 chip which is the BBC B's 8-bit processor.

Using the !65Host you can run quite a lot of the 8-bit programs originally intended for the BBC Micro. Unfortunately, protected programs won't run and neither will those using specially defined screen modes, though these are usually games.

This software is very clever and mostly under used. So if you have an old BBC Micro lurking in a cupboard you can download some old favourites using a serial link or see what current BBC Micro software is like by accessing the 8-bit programs on our MegaDisk2.

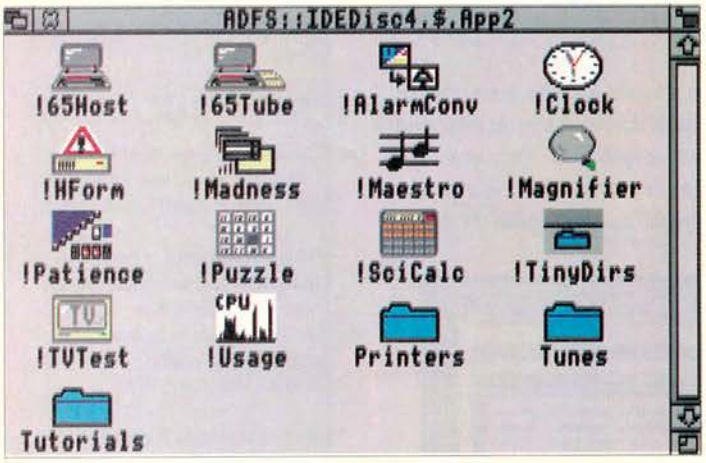
If you have a hard disk, create a directory to contain the BBC Micro programs. With a floppy disk system, format a new disk to contain the BBC Micro programs and open up the viewer to that disk by clicking on the disk icon – we'll call this the destination window/directory.

Open the directory containing the 8-bit software by double-clicking on it, click Menu while the pointer is over the window – currently showing the contents of the 8-bit directory – and click on the *Select all* option.

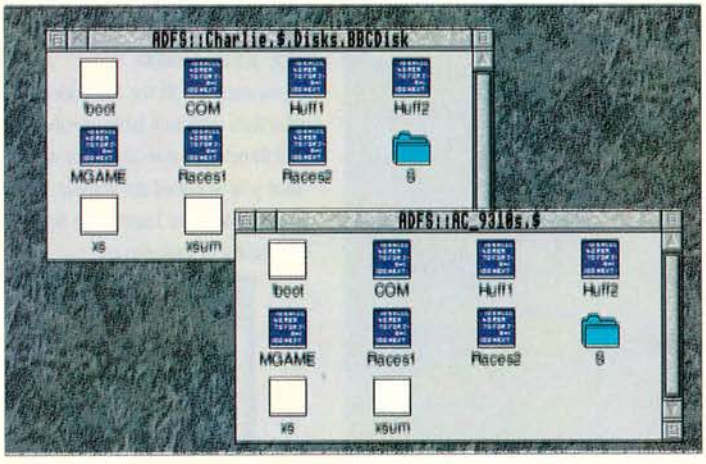
Now drag all the files across to the destination window and release the mouse button.

Without a hard disk you will be prompted to change disks – do so until the program stops prompting. It may take some time, although using a ram disk – see Newcomers in *Acorn Computing* April 1993 – will speed up the process. The BBC Micro programs are now unpacked and you can re-boot the machine.

Open the Task manager window. In RISC OS 2 click Menu on the A icon – bottom far right of icon bar –



● *You'll find the !65Host on Apps2 disk*



● *Take the 8-bit programs from the subscription or MegaDisk*

● *Once in the emulator set the directory and run the !boot file*

● *To get a blast from the past ... the menu system on the BBC disk*

This month Pam Turnbull shows how to access BBC programs on your 32-bit Acorn

and select Task display. If you have a RISC OS 3 machine click Select on the Acorn icon and scroll the window down until you see RAM disk – this is likely to have 0k beside it.

Using the left mouse button drag a bar out until the value on the left reads 128k. There may be a longish pause at this point. A black icon will appear on the left of the iconbar with the word RAM under it. Close the Task manager window and click on the RAM icon to open a window of its contents.

Open the directory or disk holding the BBC Micro programs and drag all the contents to the RAM disk window. When the programs have been copied across, locate the !65Host application on your Apps disks or hard disk.

Run !65Host by double-clicking it. After a few moments the monitor will show a representation of the BBC Micro screen. Type the following and then press Return:

```
*DIR RAM:$
```

If the programs copied came from the MegaDisk type:

```
*RUN !BOOT
```

to run the menu program for the BBC Micro. You can't press Shift+Break to run automatically as you did with the real 8-bit machines so you need to use either the RUN command just given, or more usually:

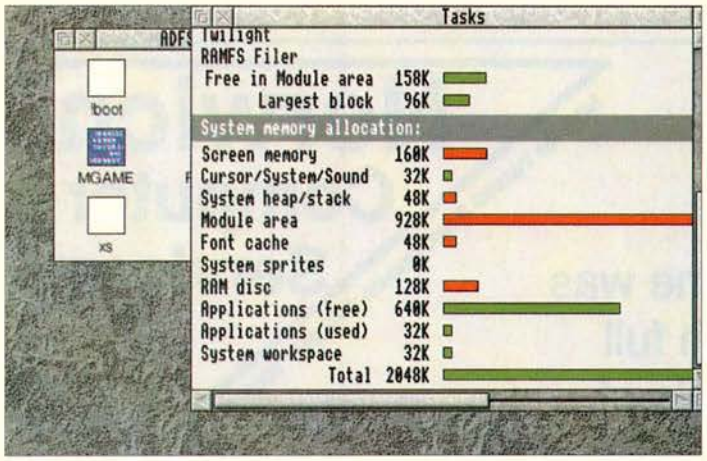
```
*EXEC !BOOT
```

And that's all there is to it. To return to the DeskTop just type:

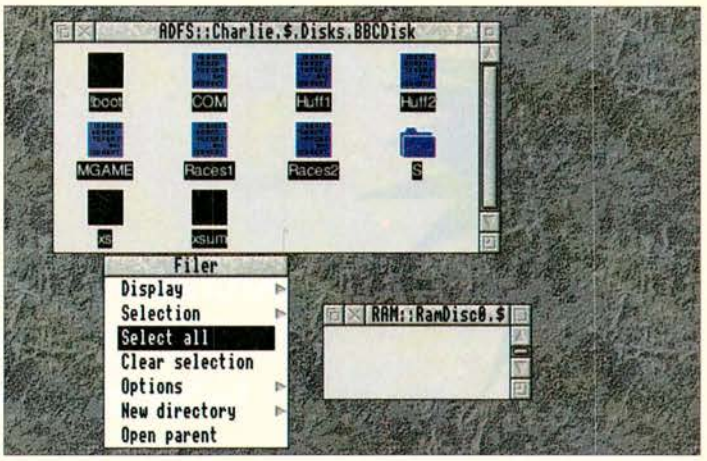
```
*QUIT
```

from the command line.

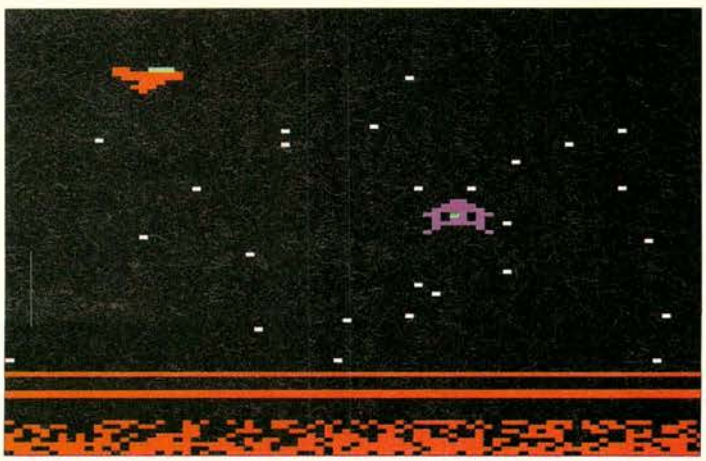
It's quite a straightfoward process which opens up a world of interesting programs.



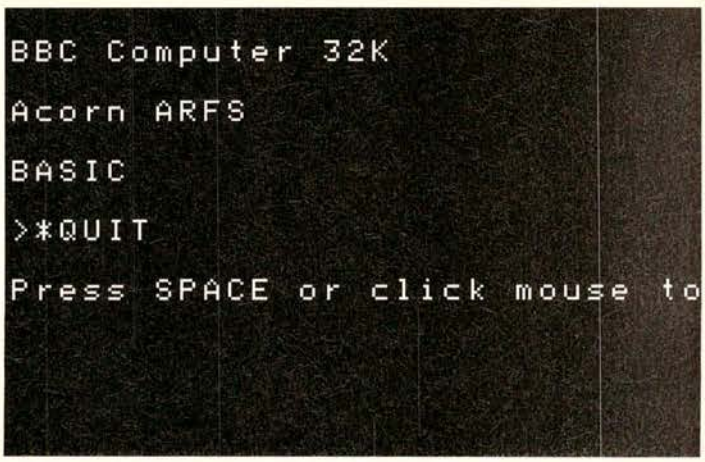
● *Open the Task Manager to create a 128k ram disk*



● *Select all the files and directories and drag them to the ram disk*



● *Most games will run successfully, though often a bit slowly*



● *Exit the emulator with just *Quit*

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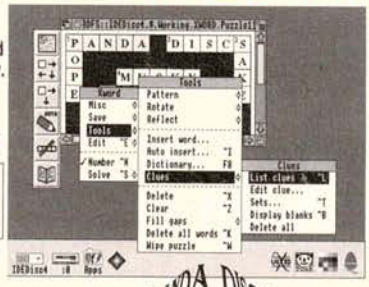

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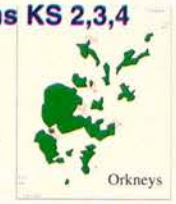

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FIRST!!!

A base in the woods

There's no better test for an application than actual use, so Steve Turnbull puts S-Base through its paces handling some real data

ONE year ago I wrote a complete database management system for the Acorn machines to handle the players and characters in The Gathering – a live version of a fantasy role playing game run by The Lorien Trust at a scout camp near Derby.

It has about 2,000 attendees and it's this large number of people that the program had to keep tabs on.

It worked but the front end had to be singletasking due to lack of time. So for this year's event I used S-Base, the only multitasking programmable database system for RISC OS machines.

The first step in this type of project is to specify exactly what's required of the database. The structure of the game has a number of political factions each of which is divided into groups of characters with each character played by one person and each person with only one character.

Characters within a group can have a certain rank determined by the total number of characters in the group. Each group has a leader and each faction also has a leader. This structure is shown in Figure I on the next page.

Each character starts with 15 points to spend and can have personal skills which cost a number of points. Some can only be acquired if others have been bought – for example there's a skill which permits the character to invoke the power of a scroll, however the player must have literacy before he can buy that skill.

A usability feature built into the system was that the scrolling list of skills only displays those that have been bought already and those that can be bought with the remaining points. This prevents any errors when buying.

The program was also supposed to take care of objects within the game environment – just as a computer adventure game might keep an inventory of what a player is carrying. However, this feature was not included in the finished program, although it will be added before the next event.

Eventually it turned out that certain people had to be able to have another character but by this time the structure of the database was firmly fixed. The task was bodged by creating additional player records.

An obvious change would be to allow players to have more than one character. But this will require a complete re-write of whole sections of the system.

In S-Base you start off by creating the files in which the data will be stored. I needed four: Faction, Group, Character and Player. For each of these you specify the data it will hold – Figure II shows the four types.

However, for each field you need a data type – integer, floating point, string and so on – but with no defaults you must create these .

This may seem long winded but it has advantages: The system is designed to be easy to use so you can create data types as you are building the file structures. Data types can have ranges added to them so, for example, you can ensure that a numeric type is only allowed values in the range 15 to 27 or strings must only contain digits.

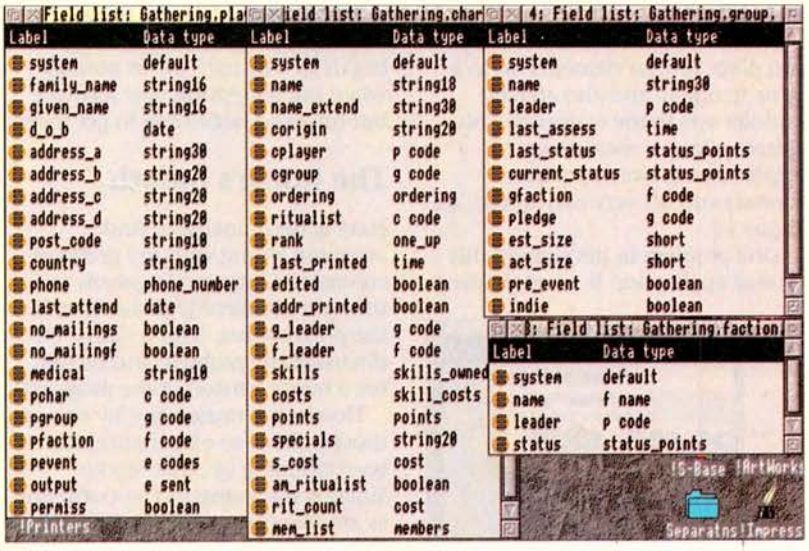
Once the initial structure was complete the time had come to get something actually happening on the screen. In its example programs S-Base uses a simple-to-design system called the *program menu*. This is not a standard RISC OS menu but a set of options in a window.

Being a purist I wanted an icon on the iconbar instead and the facility does exist. All you do is add a sprite to the sprites resources with the same name as the application and S-Base automatically puts it on the bar.

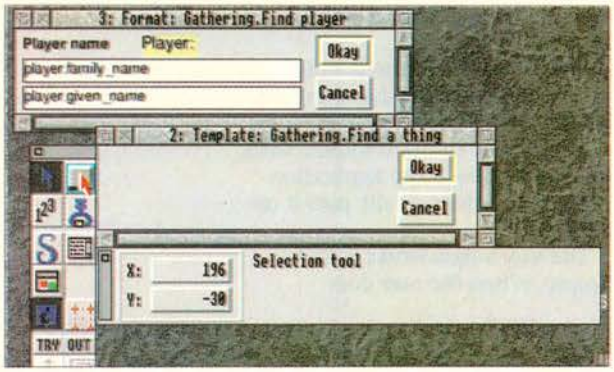
The way S-Base works is fairly simple: When the user does something with a window or icon belonging to your application, S-Base calls a *handler* that you've written and *attached* to the window or icon via a *handler set*.

For example, the iconbar icon has a handler set called *iconbar* attached to it. Within this are three handlers: Iconbar menu maker, iconbar menu select and iconbar click. The first is called when Menu is clicked on the icon, the second when a menu option is selected and the third when Select or Adjust are clicked on the icon.

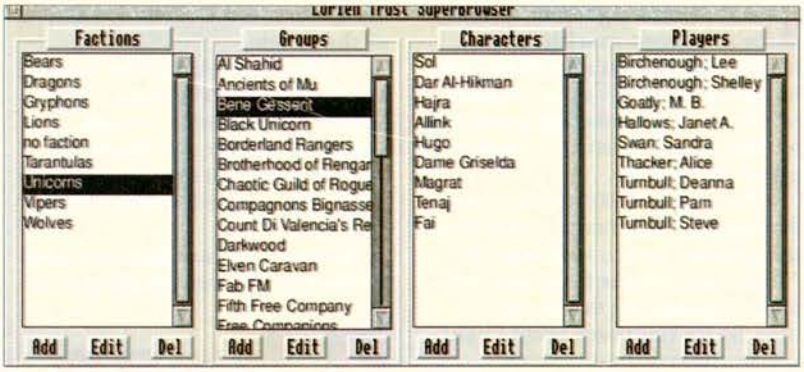
Windows can have handler sets attached to them and individual



● *Figure II: The individual file records used in the database*



● *Figure III: Putting together a card with its associated template*



● *Figure IV: The main program interface for the characters and players*

➤

icons within the same window can have different sets attached. It makes for a very versatile system.

S-Base displays data and information on the screen through the use of cards which are defined in a two-step process.

First comes the template which is equivalent to a standard RISC OS window – you control the overall appearance placement of icons and so forth.

Next comes the *format* where you can place further elements on to a basic template and also attach handler sets to the elements. This system allows a consistency of appearance between separate formats and it's very easy to use, see Figure III.

One problem in developing this type of application is when, halfway through inputting the data, you realise the need to make a change to the data structures – for example, to add a new field to the character information.

S-Base is *very* friendly in this respect as it allows you to change the structure and import the old data – or not as the case may be. Figure IV shows the finished interface, designed to be as user friendly as possible.

As we piled more and more information into the system errors began to crop up – this is normal when implementing new software but time was beginning to get short.

S-Base 2

Although the original version of S-Base required you to be a programmer to create an application, and a genius to figure out what the manual was talking about, S-Base 2 is completely different.

For the non-programmer it provides a means for creating simple applications without any contact with the S programming language.

From there you can enter the more complex world of programming if you want to.

Perhaps more important, the manual has been completely re-written so as to be comprehensible to mortals. It's a vast improvement.

The horse's mouth

Having been unable to find anything wrong with my program I contacted Longman Logotron and they put me directly in touch with the programmer, Simon Glass. We discussed the problem and he sent me a newer version of the program.

However it turned out, by one of those million-to-one chances that keep cropping up, that Steven Simatos was going to The Gathering as an attendee – it's a small world.

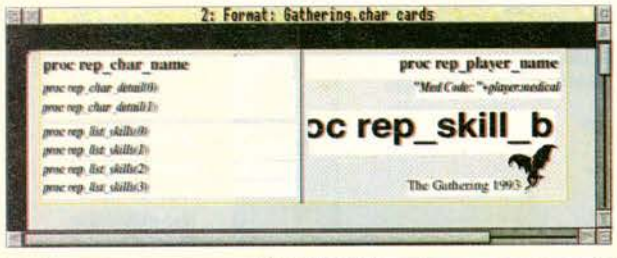
Each player had to have his own card detailing character name and skills as well as own name and a special code for any specific health problems he might have. At this type of event the possibility of injury is not insignificant and it's important to know about diabetes or allergy to penicillin and so on.

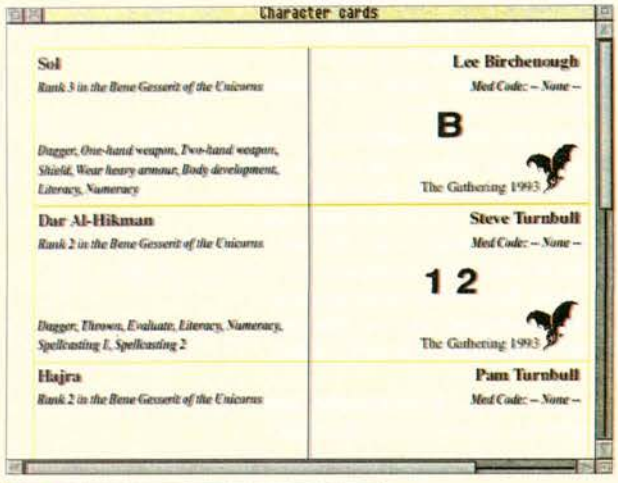
Printing through S-Base is amazingly easy: You create a special type of report card, add an area which defines the size of the record information to be printed and this is fitted into the page as many times as possible. You can either print direct or display the report in a window, see Figure V.

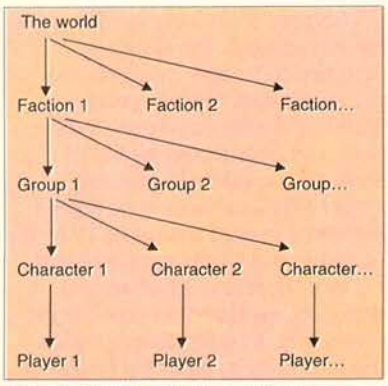
The program is going to need expanding and with an increasing number of attendees and expansion into Europe – a French Gathering-style event is planned – there's going to be a lot more data but S-Base can easily cope with it.

S-Base has been designed from scratch to permit network operation, with commands and functions to lock specific files. So for the next big event the capacity for networking will be incorporated and the computers will all be working together.

● *Figure V: Defining a report and how the data looks on-screen*




Character cards
Sol
Rank 3 in the Bene Gesserit of the Unicorns
Lee Birchenough
Med Code: – None –
B
Dagger, One-hand weapon, Two-hand weapon, Shield, Wear heavy armour, Body development, Literacy, Numeracy
The Gathering 1993
Dar Al-Hikman
Rank 2 in the Bene Gesserit of the Unicorns
Steve Turnbull
Med Code: – None –
1 2
Dagger, Thrown, Evaluate, Literacy, Numeracy, Spellcasting 1, Spellcasting 2
The Gathering 1993
Hajra
Rank 2 in the Bene Gesserit of the Unicorns
Pam Turnbull
Med Code: – None –



● *Figure I: The structure of the database needed for The Gathering*

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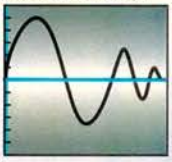

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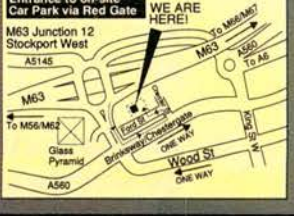

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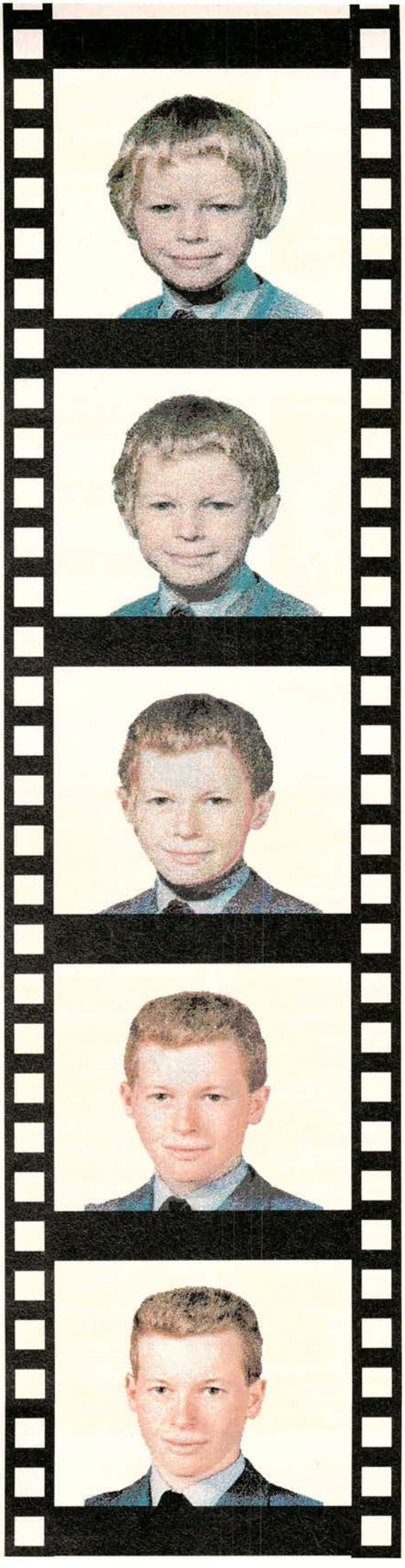

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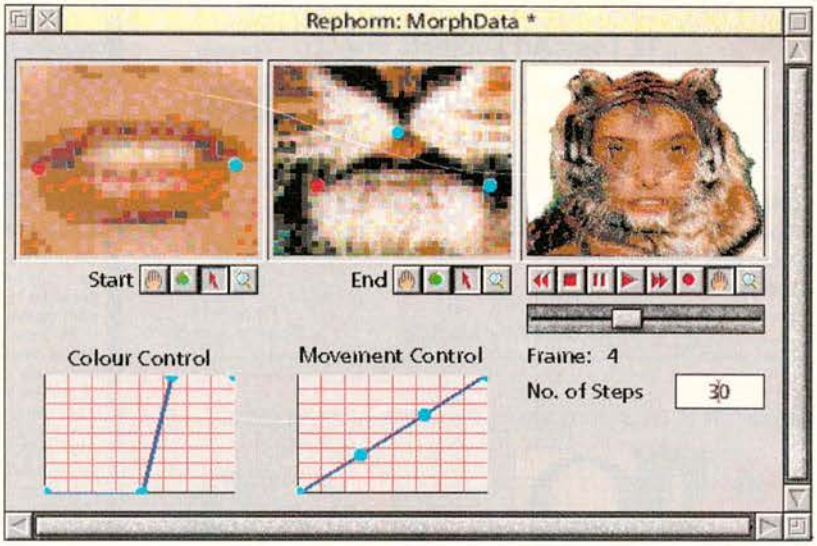

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Prophet X ACCOUNTS

'Currently the leader of the pack because of its general ease of use, comprehensive nature and high RiscOS factor. A well thought out and well supported program. Recommended' - Arc World, July 1993.

All the other Acorn magazines have also given Prophet top class reviews, but the people who really know how good Prophet is are its users (who are not without a sense of humour!).

The following extract is from a recent letter: 'Just returning Prophet V1.29 for upgrading in due course. Its getting better all the time...if you could get it to go out and take photographs for me while I go windsurfing I think that should probably do it!" - E Williams, Photographer.

Compared to other accounting programs Prophet is a breath of fresh air.

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You can also run as many different sets of accounts on it as you wish and if you're VAT registered Prophet also caters for the Cash Accounting scheme and many of the retail VAT schemes - it is also accepted by HM Customs & Excise for VAT purposes.

Other features include **Automatic Standing Orders**, Multiple Bank/Cash accounts, Stock Control, Invoicing, Statements, Purchase Orders, Credit & Delivery Notes (**all of which** are user-definable in Prophet's own DTP windows), Labels, Mail Merging and exporting of data to all the other popular RiscOS packages.

Prophet is fully multi tasking and compliant with all versions of RiscOS. It will run on any Acorn 32 bit computer with a minimum of 2mb of memory.

Prophet costs £199.75 inc VAT. An entry level version is available for £10. **This includes the save option** - any files created will load directly into the full version and the cost is refundable on full purchase so your work wont be wasted.

See Prophet on Stand 41 Acorn World '93, Wembley 29/31 October

The entry level version is now included in Acorn's new Home Office pack.

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The current version of Prophet has a myriad of extra features based on user feedback and this combined with our policy of **free upgrades** ensure that Prophet will always remain the nurnber one choice for small business accounts software on the Archimedes.There are over 600 Prophet users which include Acorn dealers such as: 4Mation, EFF, Stallion, Spacetech, Davyn, Arm-Tech, Topologika.....

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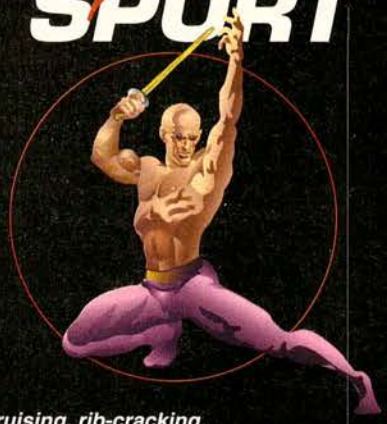

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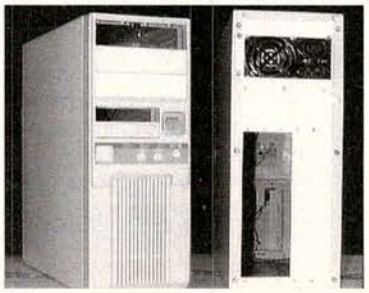

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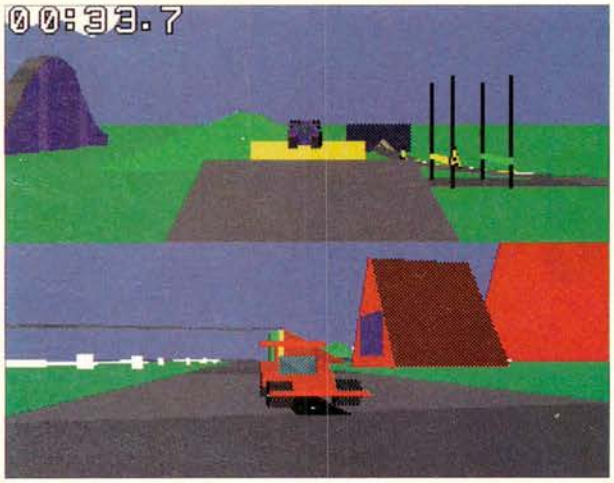
Stunt Racer 2000

...fast off the blocks

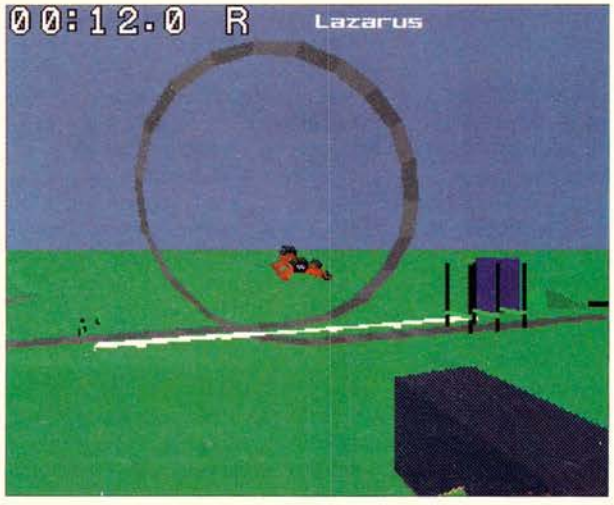
MY fave racing game til now has always been E-Type ... it may be old but I never could abide the car games that are too realistic. Well now there's a replacement for my jag in the form of Stunt Racer 2000 and it's loads'a fun.

The idea is that you are the proud owner of a stunt racing car and are entering the most popular televised racing sport in history. There are four leagues of four tracks each and you must qualify to race on each track. You can practise an unlimited number of times first, with or without other cars on the track.

If you make it into the top three of a race you get awarded prize money which you can use to enhance your driving machine in terms of power, tyre grip – very important, nitro and turbo boosts. These all cost money but you can adjust the gear ratios of the car at will – very useful, as different tracks have different needs.



● *Two player – fast and furious*



● *Ooops... and I didn't even reach the loop*

PRODUCT SPOTLIGHT

Price: £34.95
Supplier: The Fourth Dimension, 1 Percy Street, Sheffield, S3 8AU
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Once into a race you get a first person view out of the car, although, as this was written by the same people as Chocks Away, you can select outside views as well a sort of fly-by-wire car. In fact, flying does come into this game because the cars have a top speed of at least 160mph – can go higher – and the roads are not flat.

Unlike earlier race games this one does simulate wheel connection with the ground and suspension. You can take off properly by flying off a ramp and come to a bouncing landing, but if your wheels lose contact while screaming round a banked curve you're just as likely to go spinning off – even then you might come down safely if you're lucky enough to hit the ground wheels first.

One example is on a track where I screamed up an incline, flew over another car, bounced high when I hit the ground and he drove underneath me. Every race has an instant replay facility so you can see what happened from any angle. Another way of flying is to drive too slowly round the 360 degree loop – you fall off.

You can drive over any part of the terrain but driving into objects is at best damaging and at worst totally destructive to your car.

Have I given the impression that this game is fun? I hope so but there's more. Apart from the two-player one-machine split-screen version there's also two-player one machine each, a serial link cable is available. You can then race as normal, but there's more:

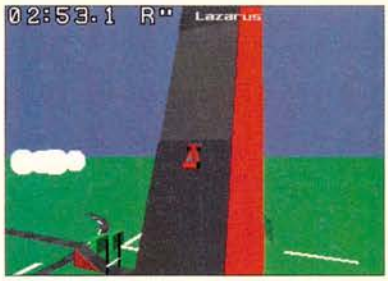
You can play a game of Killer. In this the two cars are transported to a strange five-world maze thing where your purpose is to ram your opponent to drive him into a wall or off the 500 foot high walkways you can end up driving around on.

The sound is great, the graphics are adequate and the gameplay is brilliant.

Lazarus

● *Well, one of us is going the wrong way*

● *Very pretty but the road's two-way*



● *Going up...*

...on top of the world...

...ground floor soon

Blood Sport

...ouch – that hurt!

DO you enjoy mindless violence and beating your opponent into the ground? If so, read on...

A tournament has been organised by Master Lee of Mount Sungs' Shaolin temple for those seeking a physical challenge. You have entered, the objective being to destroy the others – using the 16 savage methods you know – before they dispose of you and thus become champion.

There are four levels of difficulty and you can choose to fight adversaries controlled by computer or other humans.

PRODUCT SPOTLIGHT

Price: £11.99
Supplier: Matt Black, P.O. Box 42, Peterborough, Cambridgeshire PE1 2TZ.
Tel: 0733 315439

For complete masochists, an option allows competition against two computer-controlled fighters simultaneously – guaranteed to be a short-lived bout for the inexperienced.

Blood Sport differs from previous fighting games I've seen by concentrating play in the middle third of the screen. The sprites are finely detailed and move with less jerk than I expected. Also the backdrops are crisp and include their own animations.

When a contestant hits the deck with a particularly resounding thud the display area vibrates a little – an effective feature that adds to the atmosphere.

The stereo sound can become annoying while you fight – consisting of numerous repeated grunts, groans and growls – but can be silenced. There is the ability to re-define the game keys or choose joystick control – most are supported. I was satisfied with the keyboard, though.

That lasting addictive quality we all enjoy in a game is missing, but Blood Sport is one to reach for when you need to vent some frustration. All in all, well presented with a price tag to suit most pockets. If you like challenging fast action go for it.

Stephen Wade

● *Okay so far, but how about the landing*

● *Watch out for those high kicks*

Tales of Lore

...never mind the quality

PRODUCT SPOTLIGHT

Price: £24.95
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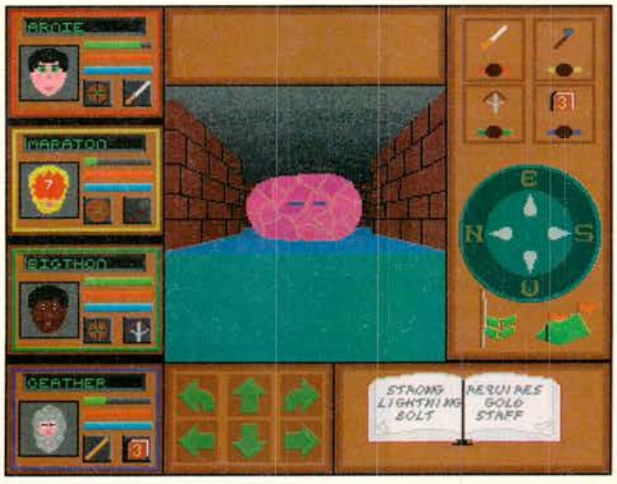

● *One level is filled with water and some bodiless Mr Blobbies*

I SAID in last month's review of The Dungeon that it had no competition. Within a few days of going to press a similar offering from UK Software appeared.

It's a roleplaying game that thrusts your ready-made party of four into a keep to do battle against those that dwell within, and survive.

The keep corridors are viewed from a first person perspective. A set of arrows on the screen permit squared-based movement – non-scrolling – in four directions, and turning. Everything is contained on one screen, producing an easy-to-use interface, but the end result is some rather small sprites with very little detail.

You start with nothing at all, not even clothes, locked in a cell. A search will find the means of release and set you off on a quest for weapons, magic potions and keys for other locked doors. You'll also have to solve some tricky puzzles that involve moving walls and pits.

You'll also meet the occasional attacker who wants to dispatch you to the netherworld but once with a spell book and the appropriate in-hand wand, adept use of closable doors and fireballs will soon see them off, even on the higher levels.

The graphics are a very disappointing 8-bit quality and the sprites are wooden with very little animation. Sound effects are pretty good, though, and you are in no doubt when a monster is in the vicinity or when you bump into a wall.

It's a nice try and a reasonable introduction to RPGs. It requires only a 1Mb machine, but it doesn't even attempt to take advantage of the Archimedes' superior graphics capabilities. It's about time someone took this side of things by the scruff of the neck and produced a world beater.

You've only got to look at some of the roleplaying games currently enjoying success in the PC market to see the kind of product Archimedes users expect and deserve.

Alan McLachlan

ALDEBARAN

The game is a real challenge and a visual feast to boot.
AcornUser

Aldebaran has a lot to recommend it. It can take many sessions to play, with a good mix of action and strategy as you juggle projects, gather resources and rescue scientists.
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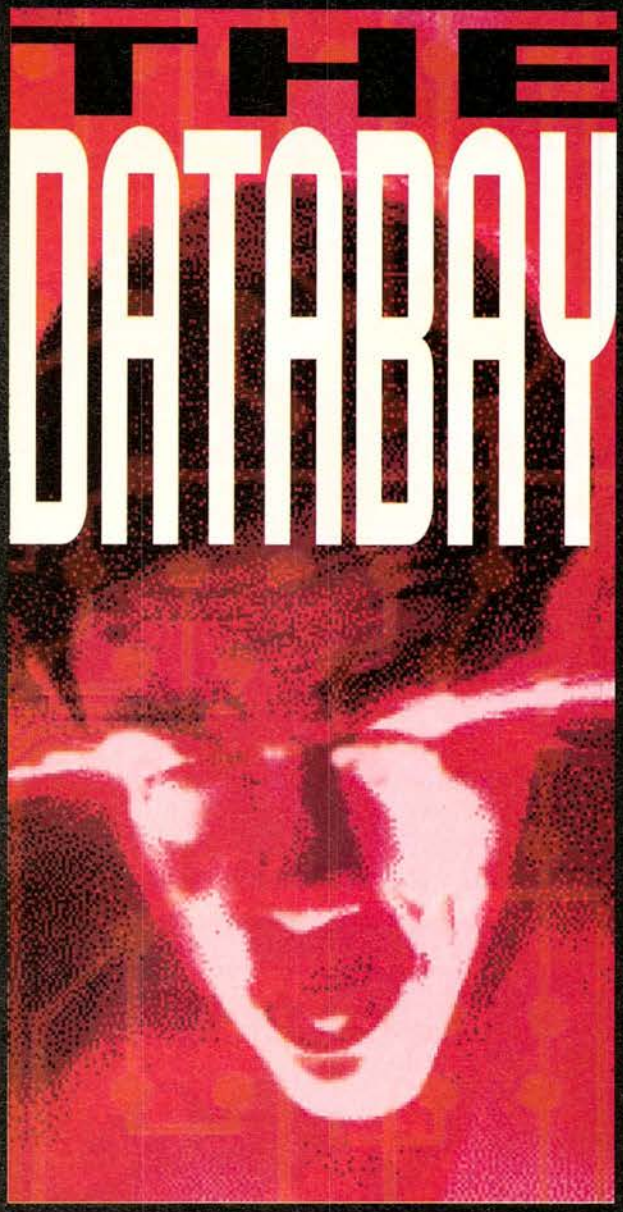


HAL logs on to another session of news, hints and cheats

AS the nights draw in and the light-emitting diodes cast flickering shadows on the circuit boards of the Databay, I welcome you to my humble home. Pull up a transistor, and read on.

How do you turn an ordinary game into an adrenalin-pumping, pixel-popping experience? Easy. I normally rig up a high resolution monitor with a 100-watt quad sound system and settle down in my biofeedback chair to enjoy the raw excitement of, say, Virtual Golf.

However, if you do not have access to this basic equipment, you could always try the simpler approach of adding a joystick, and that's where the ArmStick interface from ArmTech comes in.

The interface accepts two Atari-style joysticks and since it plugs into the parallel port of your machine, it will work on the whole Acorn range. Integral screws attach the interface more securely, and if you have time, patience and a very small screwdriver, I would recommend it.

There is no need to switch the interface on or off – the unit will sense if the printer is on line before you load a joystick module and will prevent printed data from being ambushed. Your printer can be used as normal at any other time.

Plenty of joystick modules are supplied with the package but even if a game is not catered for directly, it is simple to create a module yourself with the program supplied. A few of the older games on the market will not cooperate with the interface – Chocks Away, Blaston, Blitz and Zelanites – but ArmTech are working on them even as I write.

Once a joystick module has been loaded, the interface operates in two distinct ways – it will either support Acorn's standard joystick calls directly, or it will emulate keypresses and mouse movements which can be set up when the module is first created. To check that the system is working correctly, a joystick test program shows graphically the states of both joysticks in a window.

In use, the interface adds a new dimension to any game. When it is used in conjunction with a good joystick, movement becomes much more instinctive than with the keyboard alone. If you want to add more excitement to your software, and save your keyboard some wear in the process, the Armstick interface could well be what you need. It costs £28 from ArmTech (0352 715840).

Hint helpline

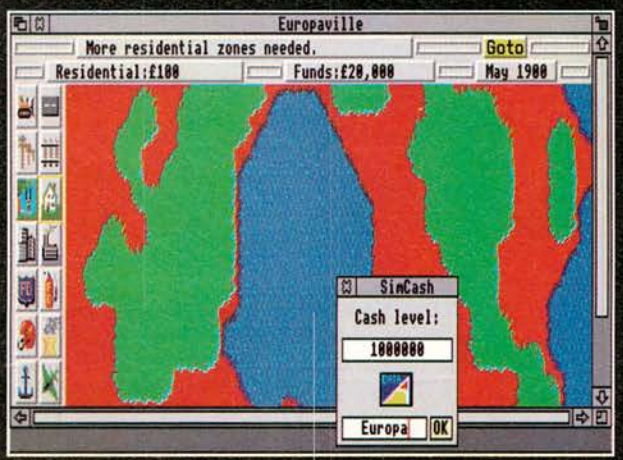
Paradroid 2000 has enough bullets and explosions to keep even the most ardent of trigger-pumping blastoholics happy and yet to do well in the game, a surprising amount of strategy must be employed. If you are having problems staying in anything less than seven pieces, take a look at this advice before you grab your plasma cannon.

Look out for those thin passages that only the bare Influence Droid can slip through – for example, there are some on the third ship, *USF Odyssey*. If you get attacked near one, you can always duck inside for cover while you plan your next move.

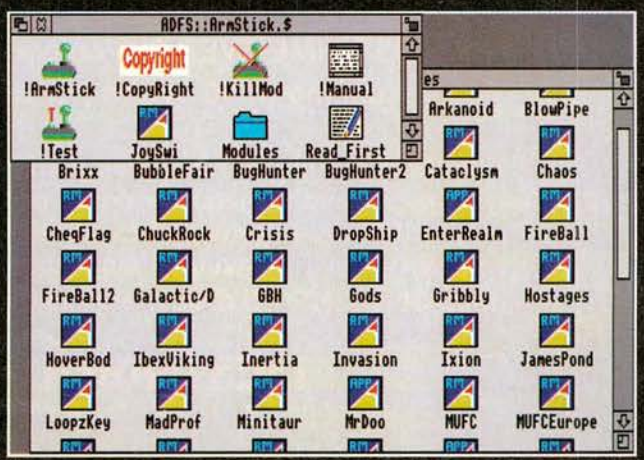
Instead of taking on the larger droids head on, try to take cover behind a doorway or wall. This is a good way of tackling the deadly tanks in the first cargo bay of *USF Paradroid*, and with a certain amount of ducking and diving, adversaries can be despatched quite easily.

Loads'a money!

If you are forever running low on cash in SimCity, dig out SimCash from the MegaDisk. Simply load the program, drag a SimCity file to its



● *Wallet feeling a bit thin? Then use SimCash*



● *Just some of the joystick modules supplied with ArmStick*

icon and alter the amount of money in the icon.

Save the file again, and enjoy unlimited supplies of cash! You can use this method to produce your own scenarios by building a city from scratch, deciding on an objective and then altering the level of money to suit.

Zoolerobics

Continuing from the hints in the last Databay, here is some more information to give everybody's favourite ninja a helping hand.

There are many different routes to success in the first two levels of Fruit World, and the higher you can go the more bonuses you'll find. Watch out for secret rooms in the last two levels, as there are two in each. The banana is a tricky customer, and you must shoot the alarm clock first to wake it up.

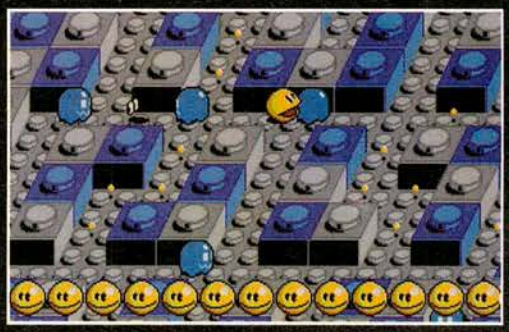
Remember – keep on your toes and aim at its eye.

Finding your way around the levels of Tool World can be hard, as vital passages are hidden. The darker bits of wood are not solid, so look around for a secret passage halfway down a chimney and move right to continue.

If you have got time to spare, look for the third bonus level – climb on to the first block you come to and jump left.

If that information isn't enough, try the cheat mode. Type in *PICKEREL* during the titles, and the border should flash blue. Hold down a number key when starting to begin at a particular world, and press the + key on the numeric keypad for a shield. *Page Up* takes you to the next level, and *Home* whisks you off to the next world.

● *Driven mad by a game? Turn to the Databay*



● *If you want to give the ghosts a run for their money, look on the MegaDisk*

Games news

The year's not over yet, and there are plenty more contenders for the coveted *Best Game of 1993* award. Krisalis (0709 372290) have promised Heimdall, Powermonger and Soccer Kid by the end of the year. There is also the possibility of a big Christmas release from Krisalis – as if Lemmings II wasn't big enough! Still, I'm not one to complain.

Taking a closer look at one of these games, Powermonger tells the tale of a king searching for a new kingdom after his own was destroyed by a terrible seismic disaster.

You must seize control of 195 territories by a blend of force and strategy to become the ultimate Powermonger. The game boasts numerous audio effects such as birdsong and bleating sheep and was designed by Bullfrog – the authors of Populous.

Superior Software (0652 658585) are due to release the second Play It Again Sam for the 32-bit Acorn range in time for Acorn World. It consists of Zarch, ArcPinball, Master Break and a new 32-bit version of Repton 2, perhaps the toughest arcade puzzler ever devised.

Those of you yearning for an exciting football game will be eager to hear about Sensible Soccer from Renegade (071-481 9214), to be released soon. If you haven't seen the game on another machine, you've a treat in store: Plenty of options to change and teams to choose from, and superb playability.

The pitch looks a little spartan at first sight with players the size of well-built Lemmings, but when you hear the cheers and songs from the spectators, the combined atmosphere is superb.

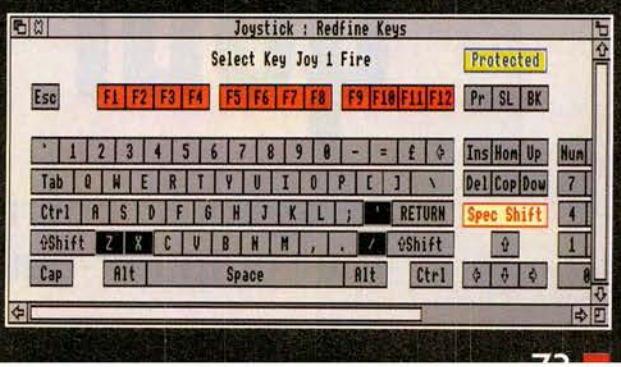
The action is smooth and fast, and there's an instant replay facility for showing off to your rivals. Two things are missing: Commercial breaks and paying to watch.

Game over

Well, that's the end of another Databay. If you have any hints, cheats or information, please send them in – *The Hacker* modules and *Games Wizard* script files are especially welcome.

Please include a stamped addressed envelope if you would like a reply.

Watch out for the Databay Christmas Special with a double helping of games news, hints and cheats, and maybe a few surprises! See you then.



● *Making your own joystick module is simplicity itself with the ArmStick*

No traps please, we're Lemmings

It's been a long wait, but it's nearly over. Lemmings II – The Tribes will be released soon by Krisalis, so in order to clear the deck, here are the remaining passwords for Oh No More Lemmings.

Wicked	Havoc
1) HelpIveGot	1) ForFishAnd
2) FourtyMore	2) ChipsToEat
3) PasswordTo	3) CantAfford
4) ThinkUpAnd	4) OwtElseSee
5) IAmRunning	5) EeeLadWhat
6) OutOfIdeas	6) DeYerThink
7) RatherFast	7) OYorkshire
8) SoPleaseIf	8) ThasGotter
9) YouAreABit	9) GiEmCredit
10) UpsetByAll	10) AndTetLads
11) ThisThenIm	11) UpInDundee
12) QuiteSorry	12) FtLemmings
13) DiddlelDee	13) XXXDAKKIJF
14) DiddlelDum	14) TheseTexts
15) TraLaLaLaa	15) ArePresent
16) TreeLeLeLe	16) ForGetting
17) NathanPaul	17) AtTheLevel
18) WeAreGoing	18) YouMayWant
19) OutToLunch	19) ToPlayFrom
20) LaterToday	20) GoodbyeAll

Try typing *FIDDLECODE* as a password for the built-in cheat mode, and if you really want to test your Lemming control, try the Super Lemming level – level 2 of Wicked. I'm afraid that Lemmings II doesn't have a password feature, so from now on, you're on your own.

Stars in your eyes

Mike Cook continues his look at the computer-guided telescope

LAST month we looked at the overall system of the computer-guided telescope. I showed each block of the system and explained why I had chosen them. Now it is time to get down to the practical details and circuit diagrams.

As I mentioned before, the design is essentially modular in nature and you can choose to implement as much or little as you like. However, the essential part of this project is that the computer has to be able to sense where the telescope is pointing.

A telescope is mounted on two axes, therefore the best way of sensing where it is pointing is to monitor the angle of each of the axis shafts. This calls for an optical shaft encoder of the pulse output type.

Shafted encoders that give an encoded output are easier to read but can't provide the angular resolution we need. In fact, we need as much resolution as we can get because the better the resolution the more accurately we will be able to point the telescope.

To give you an example, the full moon is about half a degree across – in sky terms that's rather large. Therefore, if you can only get half a degree accuracy you can't guarantee getting the object you want in the telescope's field of view. The accuracy you get depends upon ingenuity and depth of pocket.

Unfortunately, optical shaft encoders are not cheap. There is another snag, those that are small and so easier to fit have a lower resolution than the physically larger ones. Unfortunately, your problems don't end there – you need to fit them on to the telescope, which is the most difficult part of the project.

This is further complicated by the

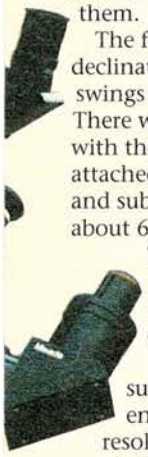
fact that there are a great many different types of telescope mounts and each will require a different solution. Fortunately, for many of the popular telescopes, mounting kits allow you to retrofit encoders.

Fitting the shafts

I'll describe how I fitted the shafts to my mount, which should give you a few clues as to how to fit yours. I didn't want to use any of the available kits due to the cost and I didn't want the fitting to interfere with the normal operation of the telescope, nor require me to drill any extra holes. And it needed to be removable.

My telescope is a 10in Mead LX10 with an equatorial fork mounting. Nowadays you can get them with built-in encoders but the design has been modified to accommodate them.

The first axis I tackled was the declination axis, the one that swings the telescope up and down. There was a bearing on each side, with the setting circle plates attached. I unscrewed one of these and substituted a large gear wheel, about 65mm across, in its place.



Then I made an aluminium plate and bolted a shaft encoder with another gear on to it.

I used the HEDS 5500 surface mounting shaft encoder, which gave a raw resolution of 360 pulses per revolution. You can get an idea of the construction from Figure I.

Now I do appreciate that this is much easier to write down than to make, but it wasn't too difficult. The use of gears has both an advantage and disadvantage. The gear ratio – in this case 8:1 – gave me better resolution for any given shaft encoder.

However, the gears also introduce a periodic error into the position indicated. I reckoned this would not be a problem with the accuracy I wanted and I could always introduce some correction in the software later. This is possible because the error will always be the same for any given angle.

Ascension axis

The right ascension – round and round – axis gave me considerably more trouble. The commercial mounting kits did not allow full 360 degree movement when they were fitted but I wanted a solution that would. I eventually decided to implement a friction-coupled design.

This had a rubber wheel, mounted in the space under one of the fork arms, running round the rim of the mount. It needs to be at a slight angle so that the encoder's body does not foul against part of my telescope's rim.

The wheel was made from the rubber rim of a Lego wheel mounted on a piece of brass I turned. There was a screw thread on it to clamp it to the shaft of the encoder.

This was by far the most difficult bracket to make as I had to get the angles correct. Also, I found that the forks were not always a constant height over the rim as the telescope was turned and so the wheel had to be spring mounted to ensure that it was always in contact with the surface and did not slip.

This also gave me a gearing advantage with regards to the resolution. You can see the general arrangement in Figure II. I used the potentiometer type of shaft encoder here – the HEDS 7500. This had a raw resolution of 256 pulses per revolution.

Optical shaft encoders

Having mounted the encoders we have to get their electrical signal into a form we can use. An optical shaft encoder give a series of pulses when turned – there are two in the mouse. In fact, you don't just get one pulse train but two in quadrature. That is to say they are 90 degrees out of phase, so you can tell the direction.

This is quite simple to do: Take one signal as your reference and when the other signal leads it is going one way, when it lags it is going the other way as in Figure III. Optical shaft encoders are characterised by how many pulses they produce per revolution and in most circuits this translates directly into the resolution. Therefore, an encoder giving 360 pulses per resolution will give one degree accuracy.

However, as I studied Figure III it occurred to me that there was much more information to be had from these signals. If you consider each edge of the two signals it is indicating some movement, therefore I thought that this extra

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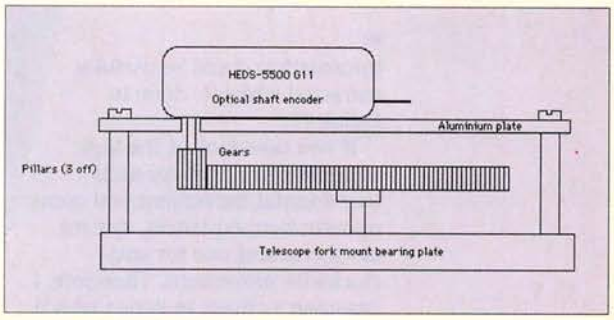


Figure I: Fixing the encoder to the Declination axis

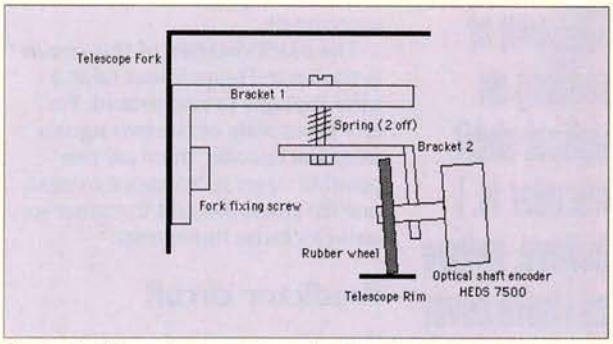


Figure II: Fixing the encoder to the RA axis

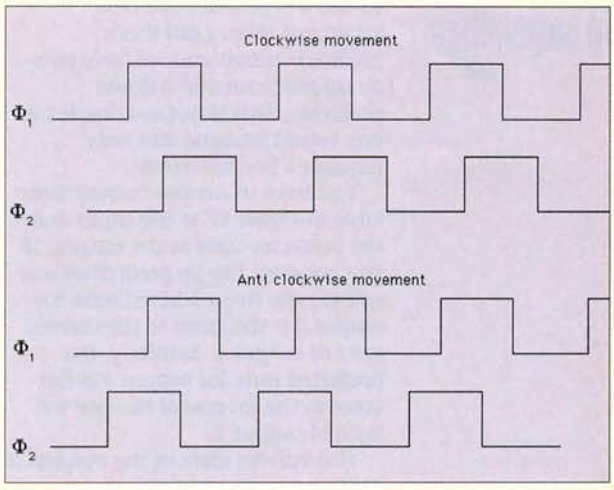


Figure III: The signals from the encoder

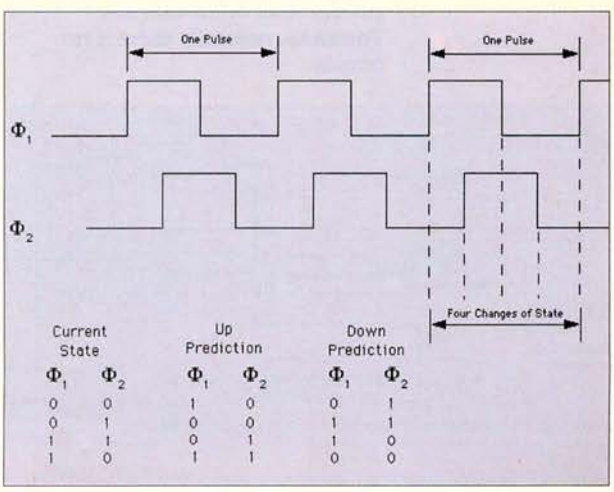
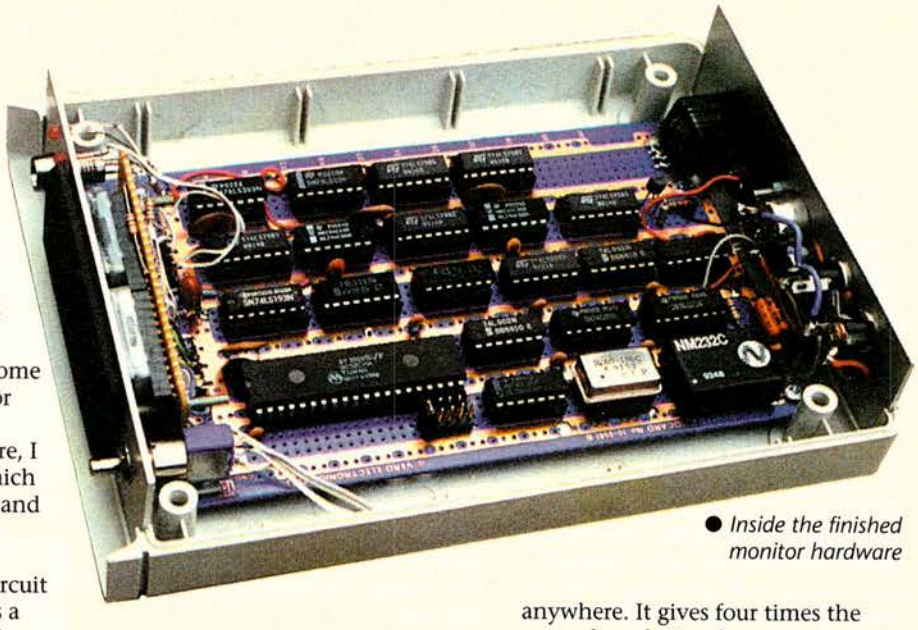


Figure IV: The information available from the encoder



● *Inside the finished monitor hardware*

> This way of reading an optical shaft encoder is, I believe, unique as I have never seen it referred to anywhere

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information could be usefully extracted which is done in Figure IV.

If you now look at the logic sequence produced for each incremental movement you come up with two sequences, one for clockwise and one for anti-clockwise movement. Therefore, I designed a circuit to detect which sequence was being produced and to clock an up/down counter accordingly.

The block diagram of this circuit is shown in Figure V and takes a little thought to understand. For any given state of the two signals from the encoder there are two possible states it can move to next, one for clockwise and the other for anti-clockwise movement.

Predictor circuit

You can construct a logic circuit that, when fed with any of the states, will produce the next rotational state. I call this a predictor circuit and we have two – an up predictor and a down predictor. This is not so complex as you would imagine and only requires a few inversions.

You have to use the current state table in Figure IV as the input and the predictor state as the output. If you consider the up prediction you will see the the predicted state for output 2 is the same as the current state of output 1. Similarly, the predicted state for output 1 is the same as the inverse of the current state of output 2.

This current state of the outputs is held in a latch and fed to the predictors and compared to the current state of the outputs. Therefore, normally there is no output.

However, as the shaft is turned the output changes and matches one of the two predicted states. This causes the comparator to produce an output, clocks the counter and latches the current state ready for the next turn.

Take time to study the block diagram, as it can be followed easily. The full circuit diagram, Figure VI, is one of those rare occasions where it is hardly possible to see what is going on.

You'll see that the outputs from the shaft encoders are fed through Schmitt triggered inverters – to remove any noise picked up from the leads into the electronics.

The 74LS75 latch provides normal and inverted outputs so serves as both the latch and predictor combined. The comparator is made from two exclusive OR gates and an OR gate. The output from each comparator is fed to the up or down input of a bi-directional counter. Finally, the comparator outputs are combined to trigger the latch to hold the new current state of the outputs.

This way of reading an optical shaft encoder is, I believe, unique as I have never seen it referred to anywhere. It gives four times the normal resolution from any given shaft encoder and I'm quite pleased with it.

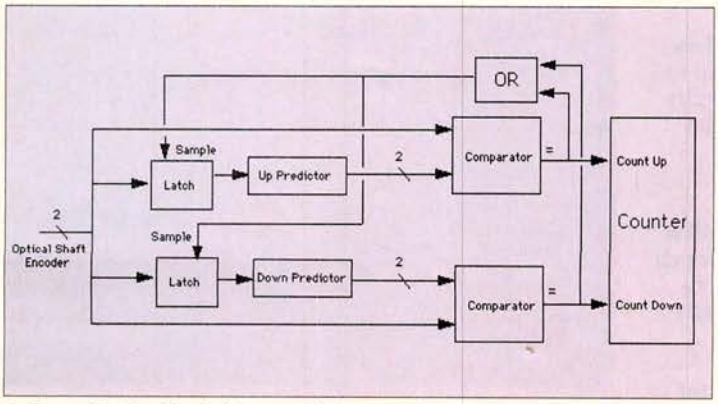
Of course, for a two axis telescope you'll require two such circuits and as you get more than one gate in a package you can use the spare NOT, NAND and OR gates from Figure VI for the other axis.

With the gearing and the extra resolution given from my interface circuit I got a resolution of just better than two minutes of arc for the declination and about 15 seconds of time for the right ascension. This was slightly better than I could display using the four digits per axis I had planned.

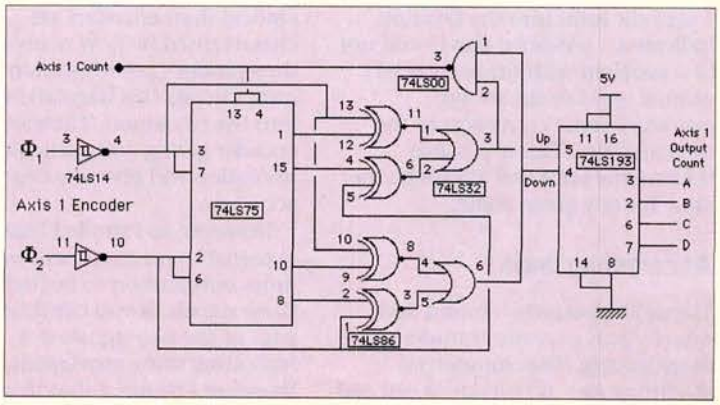
The two shaft encoders I used are available from Musbury Consultants but they are expensive as the are manufactured by Hewlett-Packard. The HEDS 5500 cost £65 and the HEDS 7500 is at £95 – the latter has almost doubled in price lately.

A cheaper alternative can be supplied by Astro Promotions (0706 815816) – in fact they can even supply the mechanical brackets to fit some telescopes. Give them a call, I found them most friendly.

● *Next month we shall see how to get the count produced by this circuit into our computer, so keep looking up.*



● *Figure V: The block diagram of the encoder interface*



● *Figure VI: The circuit diagram of the encoder interface*

Excursions into multimedia

Steve Bruntlett concludes his series with possibilities and production of art and design images in multimedia

FOR this final article I'm going to look at the use of paint, scanning and digitising systems to produce material for a multimedia application. This is the controlled display of text and images produced using a multimedia program. Sound and animation can be added if you have access to the equipment.

When referring to a multimedia application I'm talking about the final disk-based product though it equally applies CD-Rom.

I won't be tackling the use of multimedia programs themselves as I'd need more space than is available here. I will be looking at the potential of paint systems in the production of material which could be used with any of the currently available multimedia programs.

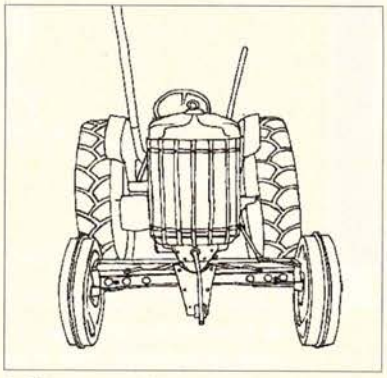
The multimedia application was produced by two PGCE (Art & Design Education) student teachers at De Montfort University while on Summer CAAD placement at Oakham School. They used Magpie to produce a guide to the Rutland County Museum.

One overriding factor needs to be taken into account is the matter of disk space. If a multimedia application is to run from an 800k disk, graphics are going to make heavy use of this even when compressed.

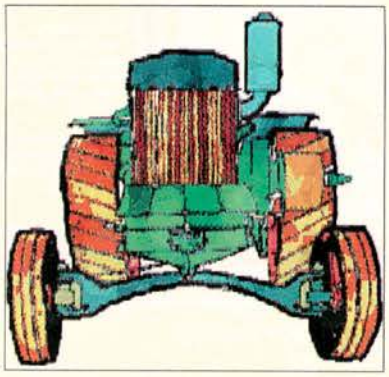
There are various ways to alleviate this. One is to avoid the use of full screen images unless you want a really dramatic screen and smaller screens combined with text often make a particular point perfectly adequately.

Alternatively you can reduce the memory required by using lower resolution modes or two or four colour modes where an image is only black and white or simply coloured.

For example, on the Oakham multimedia application, Amanda and Julia could have used Mode 28 all the time but this would have been wasted as the disk was to be used in Primary schools which predominantly use A3000s and so can only display such applications in Mode 15.



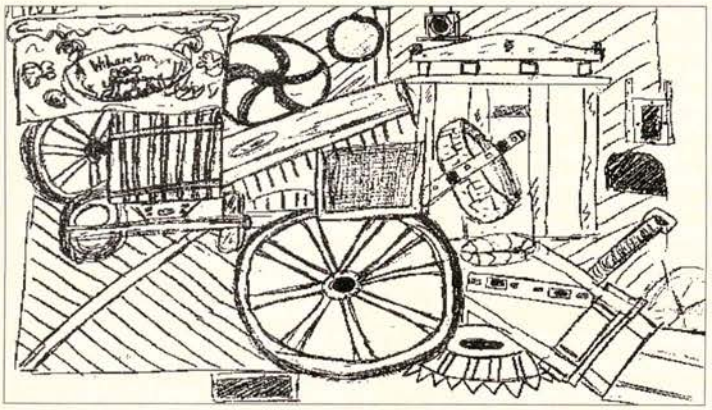
● *The scanned line drawing of a tractor...*



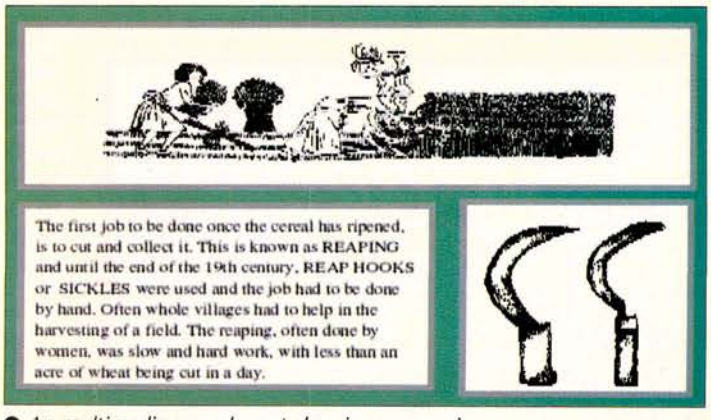
...and the coloured version which will feature in the museum guide

Another trick to save space is possible when using scanned images. Scanning can give really accurate representation of the original resource but gobble up the space.

A couple of A4 256 grey scale scans of photographs would just ➤



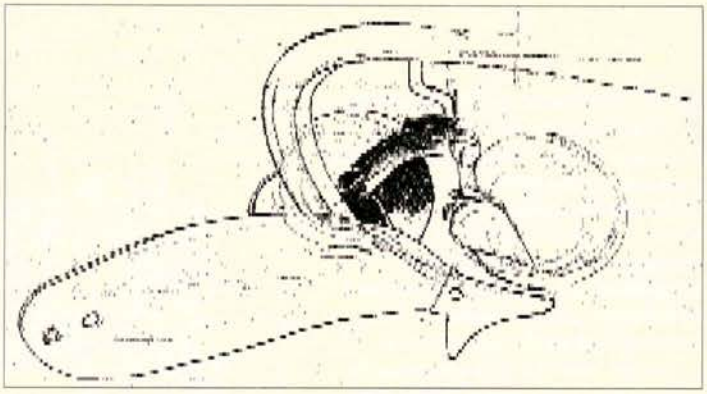
● *Drawing on location in the Rutland County Museum*


The first job to be done once the cereal has ripened, is to cut and collect it. This is known as REAPING and until the end of the 19th century, REAP HOOKS or SICKLES were used and the job had to be done by hand. Often whole villages had to help in the harvesting of a field. The reaping, often done by women, was slow and hard work, with less than an acre of wheat being cut in a day.

● *An multimedia page layout showing economic use of text, scanned and painted images*

NOW YOU KNOW YOUR WAY AROUND, TAKE A LOOK AT WHAT YOU CAN SEE
The museums assistants sit near the entrance in the old riding school. They wear a dark green uniform.
If asked politely, they may be able to answer your questions about the museum.
TO FIND OUT ABOUT THE EXHIBITS DISPLAYED IN THE MUSEUM PRESS HERE

● *A sample screen for the prototype showing how digitised images can be used*



● *Scanned line drawings can be unclear and need considerable work in a paint package*

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about fill a disk, but saving them as sprites in the final viewing mode dramatically reduces the amount of disk used.

You could also scan in mono but try and keep a balance and decide what is appropriate for each kind of image. You might decide that it's better to have a quarter screen colour image than a full screen monochrome image for example.

So what kinds of images can you produce and how might they be used in such an application? The first time Amanda and Julia took groups of Oakham pupils down to the museum for a drawing session they used vertical A4 paper with pencils.

That might seem reasonable, but when trying to scan an A4 portrait format pencil drawing two problems occur. One is that the pencil doesn't show up very well and if it does it's patchy.

The second is that when only the clearest and darkest of drawings are scanned you either have to use the top or bottom half of the image or reduce it to half size and lose a lot of detail and use it in the middle of the screen.

Here are some tips to bear in mind. You can retouch the drawings in a paint program but this can mean redrawing nearly the whole image. More preferable is to change the original drawing technique using A5 or A4 paper horizontally with fine line pens.

When these drawings were scanned, they needed minimum redrawing or cropping and could be painted straightaway rather than after a lot of tedious work.

Once drawings are scanned they can be saved as sprites and dropped into a paint program – in this case Pro-Artisan – for tidying up. They may need some processing first to increase contrast, thicken the line, change orientation or crop the image.

However, that's only one way of producing images for a multimedia application. The second way uses video and still-video cameras. Images captured on either system are processed using a digitiser to produce illustrations which couldn't be obtained by other means.

Better images can be produced by scanning photographs than by using digitisers with a video camera and certainly better than with a still video camera.

Best results are obtained by taking photographs and scanning those but this takes time and costs money. Reasonable results can be achieved using a video camera and digitiser, especially if you reduce a full screen image to quarter screen size, greatly sharpening the image and saving disk space at the same time.

A quarter screen digitised image combined with text looks good and is perfectly adequate. Such digitised images can be produced in monochrome or colour depending on your digitiser and processed further in a paint package.

One particularly successful technique is to enhance digitised images with false colours and supplement them with a line drawing to make it easier to see fine detail.

In terms of the production of such multimedia applications, you need systematically to store and catalogue all the images, preferably in successive stages of completion, with meaningful names, perhaps in different categories. You don't really need to save the original scanned images files, just the resultant sprite files, as you'll keep the original art work and can re-scan it at any time.

Hopefully this article will give you some ideas about how CAAD can be used in multimedia applications. To tackle such a project at the same time as learning how to use a multimedia program from scratch is a gargantuan task. It can be done to very good effect but is better to stage such work learning about paint packages, scanning and digitising system before you move on to the multimedia program.

However it's tackled, you need to be systematic otherwise you'll have to learn too much all at the same time making what should be an enjoyable experience a possible nightmare.

Having said that, it's an exciting way to work combining many principles tackled in Essential Paint over the last year and if you haven't enough cash to lash out on a multimedia program why not have a go with BookBinder which was on the cover disk of the August issue of *Acorn Computing?*

● *Using enhanced digitised images to clarify pertinent detail*

In conclusion

We have moved on swiftly since we started with the use of !Paint to produce images. New art packages are coming out all the time. If you can't afford programs like Revelation ImagePro or ProArtisan2, have a go with !Imagery, which was on the September cover disk.

There are now possibilities for morphing with the new program from Oregan – you can play around with a sample application on this month's MegaDisk.

In the long term there will be the new Acorn computer with the VIDC20 chip. This will revolutionise art and design as much as the introduction of the original Acorn Archimedes.

Read all about it

Paul Mason investigates the new manuals for RISC OS 3

EVER since the release of the A5000 two years ago people have been waiting for the new Programmer's Reference Manuals. The set for RISC OS 2 gave the programmer most information but was far from perfect.

The large covers were easily damaged and, as with all ring-bound manuals, the pages could easily be ripped from their bindings.

There will be those of the opinion that you should look after the manuals better – but when they are in constant use even best intentions can go to waste.

However, the pages in the new edition are glued at the edge which means they should last longer and, surprisingly, they can survive being bent back on themselves.

The page layout is also different. Out are the black margin lines, in is carefully placed bold type and the chapter name is now – more conveniently– at the top of the page.

The bold lettering definitely helps the subheadings stand out and the listing style appears far clearer than before. The manuals are also considerably thicker. Volume one has now increased from 460 pages to a more substantial 950.

The page numbers no longer run sequentially from volume one to four but instead, each volume starts at page one. This does mean that finding pages from the index is considerably easier, although, at a quick glance, it can be easy to miss the volume number.

The larger manuals mean that, besides containing more information, the contents are not necessarily in the same volumes as before. Filing systems, for example, as well as being *far* better documented, have been moved to volume two.

The first manual contains the general introduction – barely changed from the old release.

There is also **the kernel** which basically contains what used to be in volume two with **Kernel I/O** making up the rest of the volume. The second manual contains *everything* about filing systems – anything you have ever wanted to know is described together with full details of networking and the protocols used.

The third volume stays with tradition and contains details of the desktop. The Wimp section has remained superficially unchanged. Don't be deceived – many of the calls remain the same but can be used quite differently.

As well as desktop information, the third instalment also gives details of ColourTrans, fonts and the draw module, together with very detailed descriptions of the new printer system.

The final volume basically contains everything else, including an excellent description of the shared C library together with the appendixes – yes, Acorn appear to have dropped the terms appendices and indices.

The index itself has also improved, containing details of the service calls and reasonably good references to the other manuals. With the extra information it has grown to over 100 pages. The final book in the series is the new style guide which you can only get by returning the coupon to Acorn. When printed this, too, will wing its way to you.

The content of the new edition has grown with the system, although the amount of detail still isn't consistent. The filing system contains masses of information most of which should have been in the old edition as well, whereas the Squash module is barely touched on.

Overall the manual set is a vast improvement. It will still not provide all the information required by everyone, although, when it's used in conjunction with the technical manuals most people should be catered for.

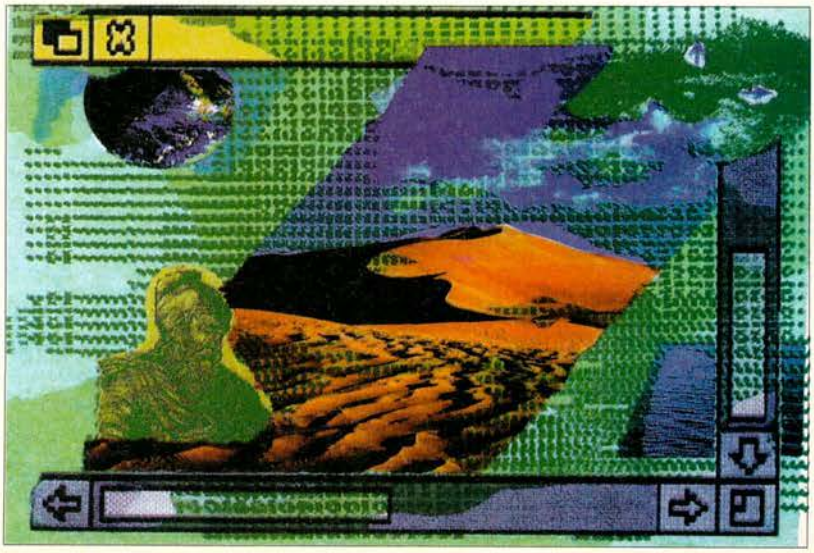
PRODUCT SPOTLIGHT

Product: RISC OS 3 Programmer's Reference Manuals
Price: £99 (£63 for upgrade from RISC OS 2 edition)
Supplier: New versions from local Acorn dealer. Upgrade offer from: Vector Services, 13 Dennington Road, Wellingborough, Northants NN8 2RL.
Requirements: RISC OS 2 edition index cover for upgrade

Summing up

Manuals are a hard thing to write – not everyone requires the same information. The RISC OS 2 editions were acceptable and filled a gap but definitely could be improved.

Acorn appear to have listened to the pleas from their customers and responded well. The new volumes are well presented and should last well until the next set appears.



The lure of M

NOW that we know how sequencers store and handle Midi data all that remains – before we start making music – is to understand how sequencers can play different sounds and music lines at the same time.

Like audio multi-track recorders, sequencers record data on to a number of separate tracks. The number varies considerably from sequencer to sequencer although all but the most basic ones have at least 16 tracks. You may recall that each track on a multi-track recorder normally holds music lines played by different instruments. How do we do this in a sequencer?

Easy! The Midi protocol can handle up to 16 different data lines at the same time. Each set of data is assigned its own line or Midi channel. In order for an instrument to play back a particular line it must be *tuned* to the Midi channel on which the music line is being transmitted.

On the face of it, most keyboards and synthesisers can only play one sound at a time. Each time you select one of the presets you get a different sound but you can't, under normal circumstances, play more than one of these sounds at the same time.

● *EMR's Studio 24 Plus lets you record lots of patterns...*

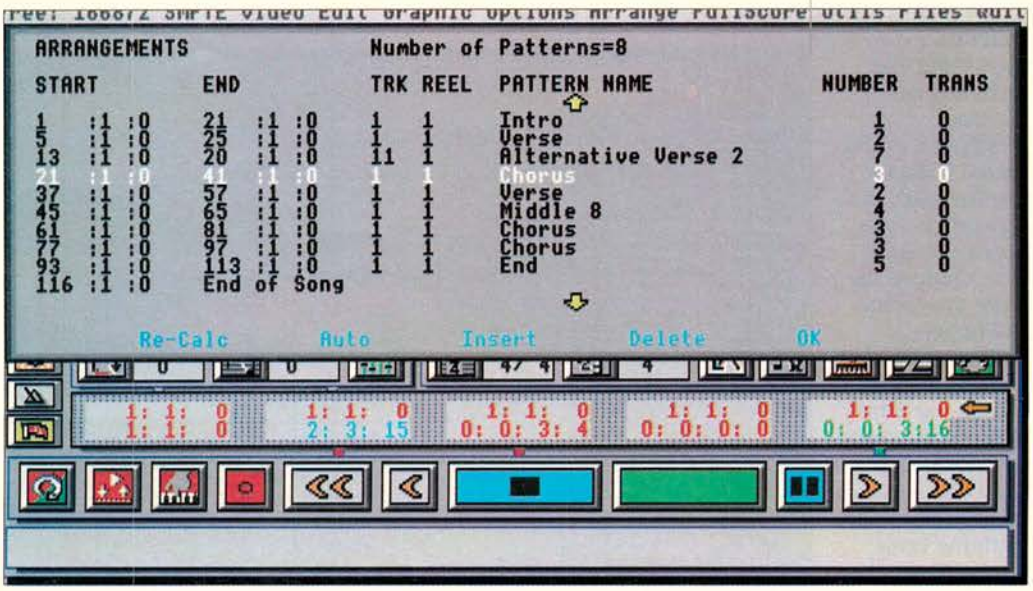
However, you can by putting the instrument into a special mode which may be called Multi Mode or Multi Setup. Specially designed for use with sequencers it lets you *tune* each sound into a different Midi channel.

The actual *tuning* or channel assignment process varies from instrument to instrument but the result is the same – the ability to play up to 16 different sounds at the same time. This is known as the instrument's multi-timbral – many timbres or tones – capacity.

It's worth pointing out that not all instruments are multi-timbral – although most are – and of those which are, not all are 16-part multi-timbral. Bear this in mind when looking for an instrument.

So, getting back to our sequencer, you can assign each track to play back on its own Midi channel. To create a multi-part recording, therefore, it's simply a matter of

...and link them in the Arrange screen to produce a finished song


ARRANGEMENTS
Number of Patterns=8
START
END
TRK REEL
PATTERN NAME
NUMBER
TRANS
1 :1 :0 21 :1 :0 1 1 Intro 1 0
5 :1 :0 25 :1 :0 1 1 Verse 2 0
13 :1 :0 20 :1 :0 11 1 Alternative Verse 2 7 0
21 :1 :0 41 :1 :0 1 1 Chorus 3 0
37 :1 :0 57 :1 :0 1 1 Verse 2 0
45 :1 :0 65 :1 :0 1 1 Middle 8 4 0
61 :1 :0 81 :1 :0 1 1 Chorus 3 0
77 :1 :0 97 :1 :0 1 1 Chorus 3 0
93 :1 :0 113 :1 :0 1 1 End 5 0
116 :1 :0 End of Song
Re-Calc
Auto
Insert
Delete
OK

Socket to me

You will find three types of Midi socket on the back of a Midi instrument. The Midi Out transmits Midi data generated by the instrument and Midi In is used to receive Midi data from a sequencer or other Midi device. This is fairly obvious.

The other socket it labelled Midi Thru and it passes on a copy of the data arriving at the In socket. It's important to note that it is not another Out socket. Thru sockets are used to daisy-chain two or more pieces of equipment.

For example, with a keyboard and an expander which you wanted to play from a sequencer, you would connect the sequencer's Out to the keyboard's In and the keyboard's Thru to the expander's In.

idi

Ian Waugh continues his look at sequencing for beginners

recording the different music parts on different tracks and assigning the tracks to different Midi channels. And that's sequencing.

Well connected

Most people get started in computer-based music with a sequencer and a keyboard – and a Midi interface, of course, which we discussed way back in December 1992.

Connect the keyboard's Midi In to the interface's Out and the keyboard's Out to the interface's In. I'd recommend you use proper Midi cables, not hi-fi cables which have a similar pin configuration.

As sequencers are designed to work like a multi-track recorder, it's usual to treat them as such and record different music parts on different tracks. Different people work in different ways but one common method is to record the bass, drum and rhythm tracks, add the melody and then record fillers or sweeteners.

With so many tracks to play with, you can record several *takes* of a part before deciding which is the best. You can also cut, copy and paste the best sections from several takes into one track.

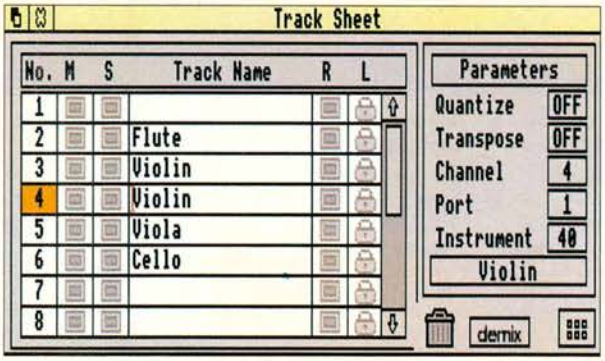
Some sequencers have an Auto Drop or Punch In function. This puts the sequencer into record mode when it reaches a certain section in the music, allowing you to record over a duff take. This is the way you had to do it with audio tape and although it really isn't necessary now, some musos like the old ways.

With audio recording you have to start at the beginning of a song and work through to the end. Most people start using sequencers this way, too, but you get far more flexibility if you adopt a pattern-based approach. This simply involves recording separate sections of music such as Intro, verse, chorus and so on, and linking them together.

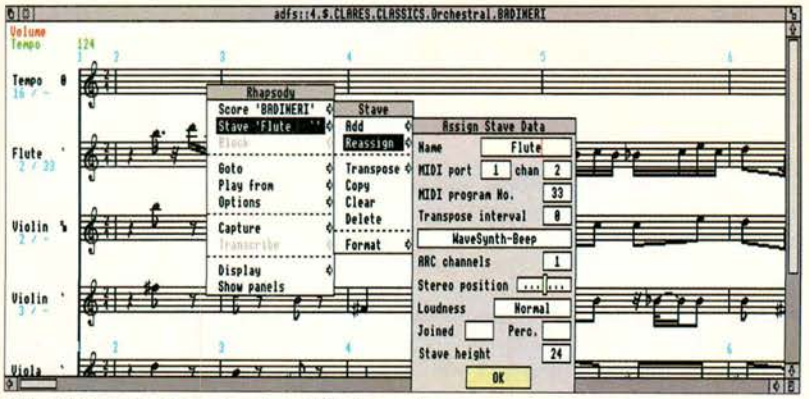
It has several advantages. If you decide to add another couple of bars to the middle eight, you don't have ➤

Step List
No. Label From To Rep
1 Intro 1 4 1
2 Verse1 5 12 1
3 Chorus 13 21 1
4 Middle8 21 29 1
5 Verse 29 38 1
6 Chorus 39 47 1
End Of Song

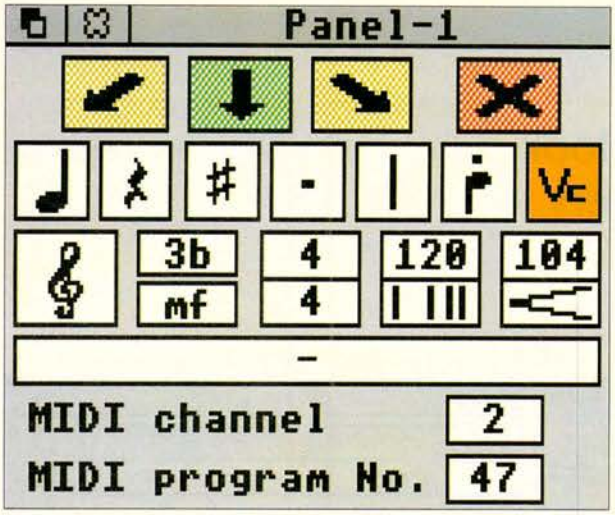
● *Although Serenade is essentially a linear-based sequencer, you can divide the recording into sections and link them in the Arrange window in order to work a pattern-based way*



● *Serenade's Track Sheet lets you assign different Midi Channels to each track and you can select sounds by Instrument number or name*



● *In Rhapsody you can assign Midi channels and Program Numbers to individual staves...*



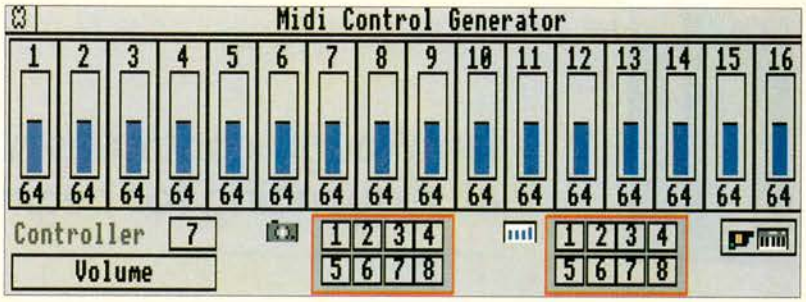
● *Unlike the others, Rhythm is a dedicated drum pattern sequencer*

➤

to push all the following material forward. You can easily try alternative verse and chorus sections simply by substituting them in the playlist. Finally, you need only record one verse, for example, but you can use it several times in the playlist.

Mixing it

Again, in keeping with the audio tape recording concept, some sequencers now include a Mixer which lets you balance the volumes of the tracks – strictly, of the 16 Midi channels – relative to each other. However, it's important to note the difference between Volume and Velocity data. The difference is important and often confuses beginners.



● *Serenade's Mixer – Midi Control Generator – can mix any kind of Controller data, not just Volume*

The volume of a note is its loudness, pure and simple. Its velocity is determined by how hard you press a key on the keyboard – the harder you press, the greater the velocity. Not all keyboards are velocity sensitive. Those which aren't generate an average velocity value of 64 – most values in Midi run from 0 to 127 – the computer buffs will know why.

Velocity usually does contribute to the volume. If a note has a very low velocity value it will be very quiet and vice versa. But velocity is also used to duplicate the effect of playing an instrument harder: If you blow a brass instrument hard you generate more harmonics and the sound will appear brighter.

Patching velocity data to a sound's filter – that part of the sound generation system which controls the harmonics – will produce a brighter sound, as well as a louder one, the harder you play.

You should now be equipped with enough knowledge to start sequencing. The best way to learn is to do. It's a good idea to read the sequencer manual thoroughly so you're fully aware of all its features.

There are dozens if not hundreds of things you can do with a sequencer which you can't do with an audio recording.

● *In the next two issues we'll have lots of useful hints and tips which will help you get more from your sequencer and turn you into a Power User.*

Sequencer check list

The major sequencers for the Arc are quite sophisticated and have an amazing range of features. If you don't yet have a sequencer, the following table compares some of the more essential features to help you towards a buying decision.

Program	Linear/pattern	Nos of tracks	Editors	Quant	Sys Ex Files	Midi
Maestro	L	4+Perc	N	F	N	N
Rhapsody II	L	63	N	F	N	Y
Serenade	L,P	16	Gd,E,	F,P	Y	Y
Inspiration	L	Unlim	B,Gd,E,Gr	F,P,R	Y	Y
Studio 24 Plus	L,P	24	Gr,N,E,D	F,P	Y	via Util
Notate	L	4/8	N	F	N	Y
Rhythm Bed	P	64	D	F	N	Y

Terms

Linear/Pattern. You may find you tend towards pattern-based recording as you gain experience although the pattern implementation in Arc sequencers is not particularly marvellous.

No. of Tracks. As Midi can handle 16 different instruments, a minimum of 16 is recommended. However, more tracks give you increased flexibility and control over the arrangement of your sequences.

Editors. Sequencers can display music data in many ways. The following are the most common formats:

B Bar display which shows music in increments of a bar, very useful for copying and pasting complete phrases

Gd Grid or piano roll editor, useful if you can't read music

N Notation or score editor which will appeal to most musicians and to educational users. Check the print-out facilities if you need to print the score

E. Event editor shows Midi events in a list, ideal for isolating specific events and for editing with pin-point accuracy

D. Drum grid editor, very useful for creating drum tracks

Gr. Graphic Editor used to draw in and edit Controller data

Quantisation. Full Quantisation pulls notes squarely on to the beat. Partial is less rigid and lets the piece retain some 'human feel'. Random is useful for putting 'feel' back into a track which Full Quantisation has taken out.

System Exclusive. Sys Ex data is primarily used to handle voice information. If a sequencer can record it you can store the sounds data used in a piece along with the music.

Midi Files. Standard Midi Files allow music to be swapped between different music programs, even those on other computers. There are thousands of third-party Midi files available and Midi File support will let you load and them on your Arc.

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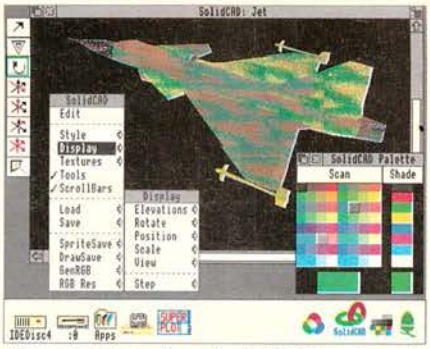

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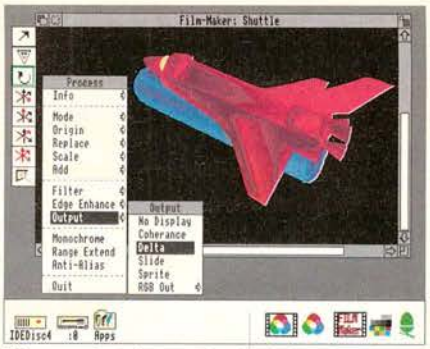

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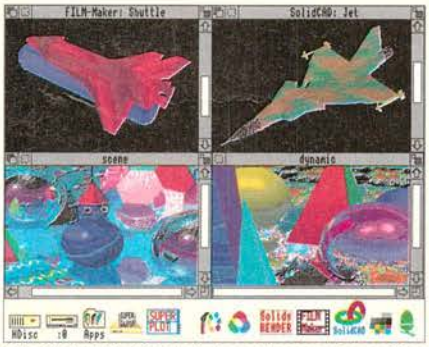

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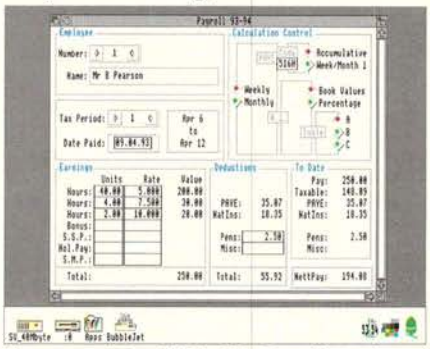

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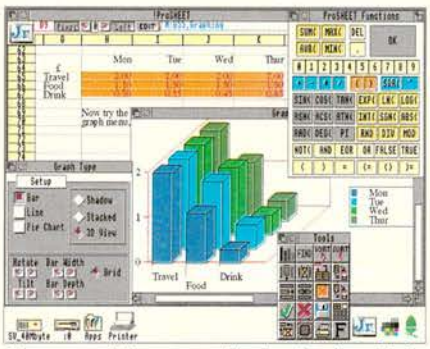

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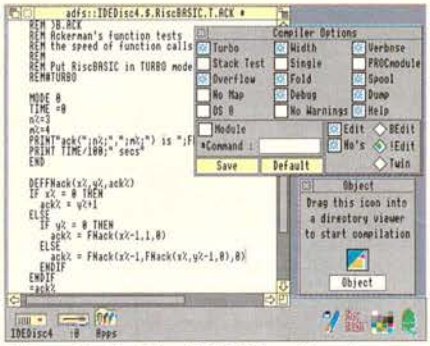

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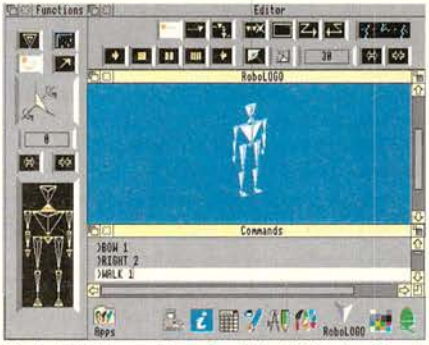

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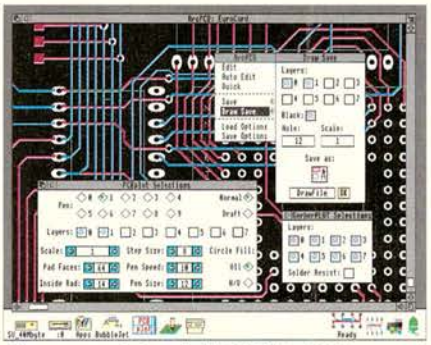

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- **R304**-A3000 – to 4MB RAM Upgrade **£99**
- **R305**-A3010 – to 2MB RAM Upgrade **£39**
- **R306**-A3020/A4000 – to 4MB RAM Upgrade **£70**
- **R311**-A305 – to 1MB RAM Upgrade **£30**
- **R312**-A305/310 – to 2MB RAM Upgrade **£85**
- **R412**-A410/1 – to 2MB RAM Upgrade **£25**
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- **R414**-A410/1 – to 4MB RAM Upgrade **£75**
- **R810**-A410/1 – to 8MB RAM Upgrade **£329**
- **R820**-A420/1 – to 8MB RAM Upgrade **£299**
- **R840**-A440/1 – to 8MB RAM Upgrade **£239**
- **A5000** – 2Mb to 4Mb additional RAM **£82**

Hi-Speed, Low Cost Archi Hard Disc Drive

Hardware

- Supports proposed ANSI ATA (IDE) specification
- Fast 16 bit MEMC interface interrupt driven to support background disc operations
- 5 Mbytes per second peak transfer rate
- Up to two drives (master and slave) per card
- Multiple cards per machine (up to four)

Software

- All software supplied in ROM
- Filing system 'IDEFS'
- Desktop filer with drive ready detection and disc name under icon
- !IDEForm, WIMP based configuration and formatting software
- Drives can be individually write protected
- Power saving standby modes supported with configurable timeout
- Drives can be used without translation in native mode for minimum overhead
- !IDEFSDisk, creates PC emulator hard discs
- Password protection available

A300/A400 Internal IDE Drive

Part No.	Capacity	Access Speed	Price
ADA 0520	44Mb	28mS	**£159**
ADA 0550	80Mb	17mS	**£195**
ADA 0530	105Mb	16mS	**£235**
ADA 0570	210Mb	15mS	**£359**
ADA 0880	330Mb	15mS	**£465**

All above 3.5" Drives are supplied complete with Controller Card & cable for use with A300/A400/A500 series machines.

AAA 0300 External Case & PSU for A3000 **£85**
AEA 1060 Archi IDE Hard Disc Podule only **£89**

A5000 Internal IDE Drive

Can be used as 2nd Internal IDE Drive

ADA 1030	80Mb	17mS	**£149**
ADA 0940	105Mb	16mS	**£189**
ADA 0950	210Mb	15mS	**£259**
ADA 0580	330Mb	15mS	**£399**

A3000 External IDE Drives

ADA 0780	44Mb	28mS	**£225**
ADA 1020	80Mb	17mS	**£265**
ADA 1050	105Mb	15mS	**£309**
ADA 1070	210Mb	15mS	**£399**

New IDE ROM Software for RISC OS 3 (upgrade) for existing users **£16**

Internal Hard Disc Drives for A3000/A3010

State of the art, 4 layer internal IDE Hard Cards for the A3000. Software supplied in, On-board ROM.

ADA 0770	30Mb	19mS	**£159**
ADA 0750	60MB	18MS	**£199**
ADA 0720	80Mb	18mS	**£219**
ADA 0730	120Mb	16mS	**£285**

Supplied ready assembled. No soldering required. Simply plug into the allotted space.

Archi IDE Hard Cards

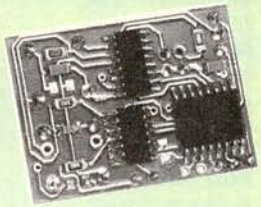
Ready to install, high performance hard cards for A300 & A400 series

ADA 0800	30Mb	19mS	**£189**
ADA 0890	60MB	18MS	**£229**
ADA 0670	80Mb	18mS	**£249**
ADA 0680	120Mb	16mS	**£295**

Acorn Multimedia

- Multimedia Expansion £485
- Multimedia Expansion + 16 bit SCSI £585

VIDC Enhancer

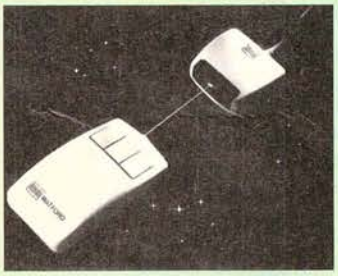


Our two unique VIDC add-on boards for the Archimedes cater for all VGA and Multiscan monitors and screen modes. The multimode software supplied, provides all the new modes for the selected monitor type, including the now standard Computer Concepts modes. With VGA monitor, you are no longer restricted to a few modes. A Desk Top application supplied on disc, allows new modes to be designed and existing modes to be modified for particular monitors.

Super VGA VIDC Card: Its unique design allows the horizontal and vertical sync to be buffered and have the polarity changed under software control **£35**

MultiVideo VIDC Card: As above but for MultiScan monitors only. **£19**

Archi Cordless Mouse



Features
- Infra Red Signal Transmission
- High Resolution 200 DPI
- High Tracking Speed of 600mm/s up
- Anti-static Silicon Rubber Coated Ball
- Low Friction Teflon Footpads
- Power - by two AAA size batteries (not included)
- Automatic Standby Mode after 5 minutes inactive
- Auto Power Shut-Down after 20 minutes inactive

Price £26

Archi A4 Scanner

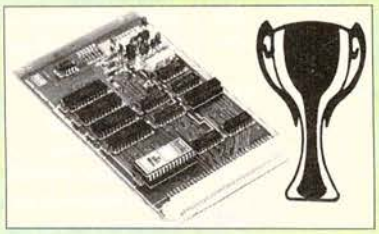
The 216mm scanning width can cope with both desktop scanning of single sheets, photographs, diagrams, etc., with its fast ten page automatic document feeder, but it can also detach from the feeder to become a convenient hand-held full page scanner for larger documents or pictures.
Scanned image control can be freely adjusted in increments of 10 dots per inch from 100 up to 400 dpi resolution with 64 levels of grey scaling. A built in shading controller and manual brightness control achieve optimum image clarity.
Unlike some scanners, which use a red light source, the Watford scanner uses a yellow/green source which vastly improves the light/dark contrast, thus eliminating the effect where any red-based colours are faded down to white and so do not show up in the scanned image.

Archi A4 Scanner	£199
Sheet Feeder for above	£75
Scanner + Sheet Feeder	£269

Spares for Archimedes

Archi Keyboard	£29	Cased Keyboard	£120
Controller VIDC	£39	A3000 Keyboard	£45
I/O Controller	£39	ARM 2 CPU	£39
A400 Floppy Drive	£59	Fan Filter	£6
A3000 Floppy Drive	£59	Keystrip	£5
A300/400 PSU	£89	MEMC	£29
A3000 PSU	£49		

Archi Real-Time Digitiser



Now supplied with NEW RISC OS Version Software

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £75

A Set of Colour Filters for colour image grabbing using a video camera **£16**

Archi to BBC Serial Link Mk 2

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers.
- Risc OS 2 Version **£15** • Risc OS 3 Version **£16**

(P.S. For A3000 Serial Upgrade **(£19)** required)

A3000 Accessories

• 3.5" External Drive	£95	• Monitor Stand	£15
• Technical Manual	£32	• Serial Upgrade	£19
• A3000 Dust Cover	£5	• Micro+monitor cover	£9
• Acorn Carrying Case for A3000			£10
• A3000 User Port/Midi Upgrade Card			£44
• A3000 User/Analogue/IIC I/O Card			£38
• A3000 External Podule Case			£15

A3000 I/O Card (User, Analogue & IIC)

This NEW versatile I/O Card from Watford, fits inside the A3000 and includes an Analog to Digital Converter, a User Port, and an InterIC (IIC) connector.

The card allows many of the peripherals developed for the BBC to be used with the Archimedes A3000. The ADC and User Port have the same pin out and connectors as the BBC computers.

Extensive RISC OS software is supplied to provide BBC OSBYTE calls for support of the ADC and User Ports, including the BASIC keyword ADVAL. The software provides extended RISC OS support for separate interrupts from both the ADC and User Ports, permitting easy interrupt driven operation.

The card is provided with all the software in ROM and is automatically loaded when the machine is turned on.

Peripherals connected to the ports can obtain up to 500mA of power at +5V. A fuse is fitted to the card to protect the A3000 from damage arising from accidental short circuit of the power output.

Features
- An 8 bit User Port with a standard 20 way IDC connector, compatible with the User Port on the BBC computers and the Archimedes I/O Podule.
- A 10 bit Analog to Digital Converter with a standard 15 way D type connector, compatible with the ADC on the BBC range of computers and the Archimedes I/O podule.
- An InterIC (IIC) Port with a 5 pin DIN socket to connect the A3000 to external IIC devices. **£38**

Cortian CKAI Interface

Eliminates need to have a User port in A3000/305/310/400/540 when using Concept Keyboard. **£28**

Concept Keyboards

• A4 Standard Pack	£89	Primary Pack	£95
• A3 Standard Pack	£94	Primary Pack	£99
• Designer Pack A4	£104	A3 D Pack	£104
• Universal 2010 Keyboard A3			£107
• Universal 2010 Keyboard A4			£104

NEW Special Finance Deal

Now everyone can afford an Archimedes Micro, monitor, printer, Hard Drives etc., with Watford Electronics 12, 24 & 36 months credit facility.

Please telephone 0582 74 55 55 for details.

Archimedes External Disc Drive Interface

With this interface it is possible to connect almost any 5.25"/3.5" disc drive with its own power supply to the Archimedes. Upto 4 disc drives can be connected. Fully Buffered Board. NO SOLDERING is involved. Supplied complete with necessary lead.

Price £21

Back Plate Extension

• A300/400 **£15;** • A3000 **£14**

ARM 3 Turbo Card MkII

Simply The Best

Here it is at last – the all new Mark 2 version of Watford's highly acclaimed ARM 3 processor board for the Archimedes and now also the A3000 series computers. Using the latest surface mount technology on a high quality four layer circuit board we have reduced the overall size to a mere 53mm x 45mm, and the cost to only £145. Mk II upgrade will increase the speed of your micro by a factor of 3 to 6.
Any competent A300 or A400/1 series micro owner can fit the upgrade himself, as we provide full fitting instructions and a special ARM chip extraction tool. However for A3000 micros and those not wishing to perform the upgrade themselves, we will collect, upgrade and return your micro by courier service, at an additional cost of £24.
(A300 and old A440 series owners please note – you will need to upgrade to MEMC1A for ARM3 to work.)

RRP £249

Special Offer £119

Network Accessories/Software

BBC B Econet Kit	£42
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A3020/4000 Econet Module	£49
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A3020/4000 Ethernet Card	£179
AUN/Level 4 Fileserver	£379
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Econet Socket Box	£7.50

(P.S. Full range of Network Accessories/Software/ Site Licences available. Telephone for details.)

Leasing finance at very attractive rates now available to Businesses (subject to status), Schools, Colleges, Universities, Government Depts. and Local Councils.

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KEY:

(Gr)aphics	(Sp)readsheet
(Ga)me	(Da)tabase
(Ed)ucational	(In)tegrated
(Mi)scellaneous	Package
(Wo)rdprocessor	(La)nguage

HOW TO ORDER

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Archi Mk II Hand Scanner

Watford's Mk II hand scanner has a maximum resolution of 400 dpi. The scanning width is 4". The sophisticated software is supplied in a 64K ROM, located on a standard single width expansion podule. As you scan a page, the image appears in the scanning window on the screen, scrolling up in real time. Other facilities include Cropping and scaling to any size including stretching and squashing in X and Y directions separately. Colour tinting. X and Y flip. Edge detection which turns solid objects into outlines. Images can be printed on any printer supported by RISC OS.
On-screen help is provided via the RiscOS interactive help facility. (Please write in for full technical details).

AHS-4 Archi 300/400 Version £89
AHS-3 Archi A3000 Version £99

Quest – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.

QT-10 BBC/Master Version £25
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Antistatic Lockable Disc Storage Units

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* Not lockable

Disc Plonker Rack

When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk.
Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

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3M – Diskettes

Lifetime warranty on 3M Discs

- *10 x 5.25" S/S D/D 40T (744)* **£5**
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Top Quality Diskettes

Watford's life time guaranteed disc are supplied complete with self stick labels & plastic library case.

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- *10 x **M7** 5.25" D/S D/D 80 Track* **£6**
- *10 x **M8** 5.25" D/S H/D Hi-Density* **£9**

Disc Drives in Monitor Stand

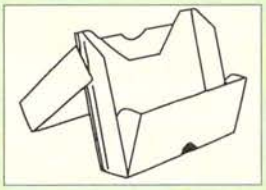
- **CDPM 800S** – Twin 5.25", 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC B & Master 128K micros. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

£139

- **DP35 800** – Same as above except, one disc drive is a 5.25" and the other is 3.5".

£135

Plastic Library Cases



DLC1 – Holds 5 x 3.5" Discs. **£1.50**
DLC2 – Holds 10 x 3.5" Discs. **£1.90**
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Attractively finished in leather-look PVC Vinyl

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DW4 – Holds 40 x 3.5" Discs or 5.25" Discs **£4.50**

Cleaning Kits & Aerosols

- 5.25" Disc Cleaning Kit **£4**
- 3.5" Disc Cleaning Kit **£4**
- PC Cleaning Kit **£7**
- Professional PC Cleaning Kit **£12**
- Aerosol Dust Spray Can **£3**
- Servisol Foam Cleaner Can **£3**
- Antistatic Aerosol Spray **£3**

Watford's MkII 1772

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1772 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1772 DFS, plus many more added features.

- Complete Kit Special Price **£39**
- DDFS Manual (No VAT) **£6.95**

Assorted ROMS BBC B/Master

ACORN ADFS	£25
ACORN BASIC 2 plus User Guide	£22
ACORN DNFS	£17
Acorn OS B+	£25
Acorn OS 1.2	£14
Beebmon	£22
Dump Out 3	£25
Graphics Extension Rom GXR-B	£21
GXR-B+	£22
Logotron LOGO	£43
MASTER OS ROM	£38
Master ULA (47)	£15
Master ULA (60)	£10
Numerator – Archi	£69
Numerator – BBC	£39
Pendown ROM	£32
SERIAL ULA	£13
TED	£15
Video ULA	£14
1Mb OS ROM	£39

View 3.0	£45	Viewsheet	£36
Viewstore	£36	Viewspell 80T	£25
InterBase	£49	InterChart	£25
InterSheet	£37	InterWord	£36
Mega-3 ROM	£76	Spell Master	£42

Wordwise Plus £38#
Price includes a FREE Wordaid Rom
View Printer Driver ROM £29
Word-Aid £24

BBC Micro Products

Quest Mouse III & Quest Paint	£39
Quest Mouse III, Quest Paint, AMX StopPress & Pagefont	£59
Quest Mouse III Only	£25
Quest Paint Only	£23
Quest Font Disc (22 fonts)	£15
Red Mouse Mat	£3
Green Mouse Mat	£3
Blue Mouse Mat	£3
Conquest-Quest Extensions	£24
Quest Colour Dump Disc for Integrex 132	£18
AMX Mouse & Superart	£39
AMX Mouse Only	£25
AMX Superart	£25
AMX Stop Press DTP	£18
Page Fonts (20 fonts)	£13
Wapping Editor DTP	£39
Wapping Editor & Quest Mouse	£59
Wapping Art Disc (Clip Art)	£15
Wapping Font Disc 1	£12
Wapping Font Disc 2	£13
32K Shadow Ram Extension Card 32K Memory Expansion for the BBC Micro	£45
BBC Master Twin Rom Cartridge	£9
BBC Master Quad Rom Cartridge	£14
32K ROM/RAM Card for BBC'B	£39
64K ROM/RAM Card for BBC'B	£52
128K ROM/RAM Card for BBC'B	£83
16K Static Ram for ROM/RAM	£8
16K Dynamic Ram for ROM/RAM	£13
Battery Backup for ROM/RAM	£3
Sideways ZIF External ROM Socket	£18
Solderless Rom Board	£32
Solderless Rom Board Utility Disc	£8
Data Duck – Plug 2 Disc drives into BBC	£14
Power Duck – Power 2 drives from BBC	£8

Acorn & Watford DFSs

- Watford DFS Kit complete **£42.00**
- DFS Manual (comprehensive) **£6.95**
- Acorn DNFS ROM **£17.00**
- Acorn ADFS ROM only **£25.00**
- Acorn 1772 DFS ROM Kit **£42.00**
- Acorn DFS Kit complete **£42.00**

TEX EPROM ERASERS

TEX Eraser operates following the manufacturer's specifications, to give maximum possible working life to EPROMs by not erasing too fast. Erases up to 10 EPROMs. Has an automatic safety cut-off to switch off UV lamp when opened. **£36**

- Spare UV Lamp **£12**

Acorn Speech Synthesizer package complete, for the BBC B Microcomputer
Special Offer £6

Microvitec Monitors

- **1451** – Medium Resolution #**£199**
- **Cub3000** Medium Res for A3000 #**£195**
- **CubScan 1440** – 14" **£389**
- **CubScan 1450** – 15" FST **£POA**
- Dust Cover for Microvitecs **£5.50**
- **Touchtec 501 Touch Screen** **£239**
- **Touchtec 3000** (For RiscOs 2 only) **£POA**

3 years parts & labour warranty

Multiscan Monitors

Eizo T240i	£483	Pan TX1713MAB	£616
Eizo F340i-W	£625	Phil 4CM4270	£289
Eizo F550i-W	£899	Phil 7CM3279	£249
NEC 2A-N	£274	Phil 7CM5279	£269
NEC 3FG	£360	Taxan 787	£229
NEC 3FGe	£449	Taxan 787LR	£239
NEC 4FGe	£479	Taxan 789LR	£289
NEC 5FG	£899	Taxan 795-PC	£465
NEC 5FGe	£789	Taxan 875+ LR	£737
Panasonic C1381	£199		

Panasonic monitors carry 2 years on-site maintenance warranty

Aries AlphaScan Monitor

Its multiscan circuitry provides automatic adjustment for frequencies between 31 and 56KHz horizontal, and 43 and 70Hz vertical. Its 0.28mm dot pitch high resolution tube provides super sharp text graphics, while a high speed (70/72Hz) refresh rate provides a flicker-free display easing the eye strain. The VIDC Adaptor supplied with the monitor allows high resolution operation in all screen modes. **£299**

- Aries Alphascan 17 Plus – 17" **£585**
- Aries 6000 – 15" Flat Screen, 0.28mm non-glare 1024 x 768 non-interlaced (70Hz) Microprocessor controlled **£395**
- Aries 7000 – 17" Flat Screen, 0.28mm non-glare. Maximum resolution 1280 x 1024 non-interlaced. Microprocessor controlled **£625**

Philips Monitors

- **BM7502** 12" Hi-res Green **£88**
- **CM8833ii** 14" med. Res Colour. Ideal for BBC B; Master & Archimedes **£192**
- Dust Cover for Philips Monitors **£6**
- Spare Monitor Leads (various) **£7**

Credit Card Hotline
0582 745555

Continued→ → → → → →

Pace External Modems

All Pace modems are BABT Approved and include a 5-Year Parts & Labour Warranty

Linnet Plus – Intelligent, V21/23 Auto Dial/Answer, Hayes Compatible £89

Linnet 24 – Intelligent, V21/V23, V22, V22bis, Auto Dial/Answer, Hayes Compatible £142

Linnet Quad – Intelligent, V21/23, V22, V22bis, V42, MNP 4&5, Auto, Dial/Answer, Hayes Compatible £175

Linnet 32 – V32, V22bis, V42bis, V42, MNP 4&5 £249

Linnet 32+ – V32bis, V32, V22bis, V22, V23, V21, V42bis, V42, MNP 4&5 £299

Ultralink Quad – V22bis, V22, V21, V23, V42bis, V42, MNP 4&5, Upgradable to Ultralink 32 Plus Spec. £199

Ultralink 32+ – Intelligent, V32bis, V32, V22bis, V22, V21, V23, V42, MNP 4&5, 2&4 wire leased line with P.S.T.N., dial backup and auto restore £429

Archi Comm. Software

- Hearsay £69
- Arc Comm £45
- RS-232 Cable for above modems £9

Printer Leads

- BBC Centronics 4' £5; 6' £6
- Archi Parallel 2m £5; 5m £9; 10m £13
- PC Parallel 2m £5; 5m £9; 10m £13
- 25 pin D Male/Male 2m £5; 5m £10
- Centronics Double Ended 4' £5; 6' £6; 5m £10; 10m £14
- RS232 Leads Various £POA

Integrex Ink Jet Printers

- Paper Roll for Integrex 132 £6.50
- BBC Screen Dump Software £10
- Colour Cartridge £23
- Black Cartridge £14
- 100 A4 OHP transparencies £55
- Colour Jet 2000 £599
- Betajet Ink Jet Printer £185
- Betajet Cut Sheet Feeder £43
- Integrex Colourjet Series 2 £335
- Auto Sheet Feeder for Series 2 £45

Star Printers

	Printer	CSF	Ribbon
LC15	£186	£135	£5
LC20	£102	£60	£4
LC100C	£117	£65	£9
LC24-15	£242	£135	£5
LC24-100	£142	£69	£5
LC24-20 Mk2	£170	£65	£5
LC24-200C	£205	£65	£12
LC200 C	£151	£65	£12
Star Jet SJ48	£169	£43	£16
SJ144C	£399	–	–
XB24-200C	£322#	£80	£12
XB24-250C	£389#	£139	£12
ZA-200C	£258#	£89	£12
ZA-250C	£324#	£139	£12

Includes 12 months on-site warranty

- Black Ribbons for Colour Printers £5
- Serial 8K I'face LC10/15/24/200 £52
- 32K Buffer LC/XB24-10; 15; 200 £52
- Star/Archi Colour Printer Driver £15

NEC Printers

	Printer	CSF	Ribbon
P22Q	£190	£59	£6
P32	£255	£59	£6
P62	£339	£79	£8
P72	£395	£115	£8
P90	£577	£115	£8

- Jetmate J400 £169; • Jetmate J800 £249

- Black Ribbons P20; P32 £6
- Ribbons P60/70/P90 Black £8; Colr £14
- P60/70 Colour Option Kit £59
- CSF for P20 £59; P60 £89; P70 £89

Laser Printers

All Laser printers (excluding HP Lasers) include 12 Months On-Site maintenance

Brother HL4-PS Postscript	4ppm	£965
Brother HL6 – NEW –	6ppm	£427
Brother HL10-PS	10ppm	£1265
Brother HL10-DV	10ppm	£1016
Brother HL10-DPS	10ppm	£1435
Canon LBP4 LITE	4ppm	£478
Canon LBP4+ 1.5M RAM	4ppm	£639
Canon LBP-8 Plus IIIR	8ppm	£1420
Canon LBP-8 IV 600DPI	8ppm	£932
Epson EPL-4300	4ppm	£520
Epson EPL-5000	6ppm	£439
Epson EPL-5200 – NEW –	6ppm	£525
Epson EPL-7500 PS	6ppm	£1135
Fujitsu VM600	6ppm	£579
HP Laserjet 4 ML	4ppm	£757
HP Laserjet 4	8ppm	£1049
HP Laserjet 4L – NEW –	4ppm	£459
HP Laserjet 4M PS	8ppm	£1369
HP Laserjet 4si	16ppm	£2199
HP Laserjet 4Si MX 1200 DPI	16ppm	£3325
NEC Silentwriter S62P PS#	6ppm	£990
NEC Silentwriter S102	6ppm	£893
NEC Silentwriter2 290	8ppm	£1125
NEC Silentwriter 290P PS	8ppm	£1449
OKI OL400E	4ppm	£419
OKI OL410		£589
Panasonic KX-P4410	5ppm*	£445
Panasonic KX-P4430	5ppm*	£579
Panasonic KX-P4451 DB	11ppm*	£839
Panasonic KX-P4455 PS	11ppm*	£1249
Star LP-4 Post Script	4ppm	£759
Star LS-5	5ppm	£473
Star LS-5 EX (RISC Based)	5ppm	£595
Star LS-5 TT True Type+Mac	5ppm	£739
Star LP-8 III postscript	8ppm	£1125

*2 years on-site warranty

FREE Logitech Scanman 32 scanner & Microsoft Publisher

- HP Laserjet 4L 3 years on-site £100
- HP Laserjet 4si 3 years on-site £505
- HP Laserjet 4/4M 3 years on-site £170

Laser Toners

Canon 2, 3 & 4	£52	KXP4450/50i/55	£20
Canon LBP8-IV	£75	KX-P4420/30	£30
Canon 8/Star LP8	£59	NEC SWriter	£84
Epson GQ	£12	HPII/D, III/D	£60
EPL 40/41/4300	£55	HP IIP, IIIP	£54
EPL 71/7500	£117	HP4/4M	£72
EPL 8100	£117	HP Laserjet 4L	£59
Qume Crystal(3)	£84	OKI OL400/800	£21
Star LP4	£52	OKI OL400e	£17
Star LS5	£69	VM800 8K pages	£99

Laser RAM Upgrades

Type	1M	2M	4M	
IIP; IIIP	£49	£80	£132	
II & IID	£60	£96	£142	
LJ4/4M	£69	£75	£175	8M/£279
EPL4100	–	£120	–	512K/£52
KX4420/50i	£59	£89	£149	
NEC S62/S102	£99	£180	–	
Star LBP	£139	£275	–	
Laserjet 4L	£75	–	–	

Jetpage Postscript Cartridge

- HP IIP/IIIP £225 • IID & III £227

Various Add-Ons

- Laserjet Appletalk Interface £135
- HP Adobe Postscript+ Cartridge £359
- Pacific Page Postscript £259
- HP Premier Font Collection £28
- Laserjet Various Font C'tridges from £45
- HP Postscript Module for LJ4 £270
- Laserjet 4 Powered envelope feeder £199
- Jetdirect Ethernet Card for Laserjet IIIsi/4/4Si £359
- 500 Sheet paper cassette (3rd Bin) £205
- HPIIP/IIIP Lower Cassette Tray £115
- Canon LBP-4 Lower Cassette Tray £96
- Ozone Filter P4420 £9; P4450/55 £20

Panasonic Printers

	Printer	CSF	Ribbon
KX-P1123	£129	£49	£7
KX-P1170	£98	£59	£6
KX-P1624	£267	£126	£8
KX-P1654	£334#	£126	£8
KX-P1695	£270	£126	£6
KX-P2123M	£148	£69	£7
KX-P2124	£220	£89	£7
KX-P2180M	£128	£69	£7
KX-P2624	£272#	£126	£8
KX-P2023	£158	£155	£8

FREE – Printer lead with every Panasonic printer listed above

Includes 12 months on-site warranty

- Dustcover for 80 column printers £6
- Serial Interface for above Printers £46
- Black Ribbons for P1081, 1180, 1124 £7
- Brown, Blue or Red Ribbons for KX-P1081/1592/1595/1695 £9 each
- 32K Buffer for above Printers £16

Colour Kit for KX-P2180; KX-P2123 and KX-P2124 £37

Citizen Printers

120D+	£94	Swift 200	£178
PN-48	£179	Swift 240	£200
Swift 90	£132	Swift 240C	£212
Swift 90C	£198		

2 years parts and labour warranty on all above Citizen Printers.

- Swift 24 Ribbons: Black £4 Colour £13
- Cut Sheet Feeder for 80 col. printers £75
- Citizen 120D Ribbons £3.50
- Archi Colour Printer Driver £15

Hewlett-Packard Printers

DJ500 colour	£242	Desk Jet 1200C	£1045
Desk Jet 510	£199	DeskJet 1200C PS	£1452
DJ 550 Colour	£399		
DJ Portable	£185	Deskwriter 550C	£459
Deskwriter	£299	PaintJet XL300+	£1675
Deskwriter 500C	£349	PaintJet XL300PS	£2619
Quiet Jet plus	£299		

+ Includes 12 months on-site warranty

3 years on-site maintenance available as follows:

DeskJet & DeskWriter mono	£55
DeskJet & DeskWriter colour	£65

*Paintjet Cartridge Black £17; Colour £27

- DJ Portable CSF £49; Carrying Case £49

Special Offer

When you purchase any Hewlett Packard printer from us, you qualify for the following software offers:

- Adobe Type Manager v2 £45
- Designworks Software pack at £39
- Lotus Organiser Software at £39

Hi-quality InkJet Paper
A4 90gsm 500 sheets £9

Desk Jet 500 Accessories

- Ink Cartridges Black £16; Colour £23
- High Capacity Ink Cartridges Black £25
- Ink Refill Double Pack (JetFill) £10
- Ink Refill High Capacity (JetFill) £16
- Deskjet Turbo Driver £45 (only £39 when purchased with printer)
- Archi – DJ550 Colour Printer Driver £14
- Epson FX Emulation Cart.(500 mono) £45
- IBM Proprinter Emulation Cartridge £59
- Wordperfect Cartridge £89
- DJ 500 Dust Covers £6
- 636G 50 x Transparencies A4 £40
- 636J 50 x Glossy Paper A4 (also XL) £40
- 630Z 50 x Cut Sheet Paper A4 £15

Plug In Font Cartridges for DJ 500

22706B - Prestige, Elite, Line Draw	£55
22706C - Letter Gothic & HP Line Draw	£56
22707P - Proprint Emulation Cartridges	£57

HP Paintjet/XL Accessories

- 630P 200 Z-Fold paper 8.5 x 11 £14
- 630Q 50 Transparencies 8.5 x 11 £39
- 630S 50 Transparencies A4 £40
- 630Y 200 Cut Sheets 8.5 x 11 £14
- 631Y 200 Cut Sheets A4 £18

Epson Printers

	Printer	CSF	Ribbon
FX870	£265	£47	£4
FX1170	£335	£69	£6
LQ100	£132	£–	£4
LQ500	£204	£–	£–
LQ570+	£201	£39	£4
LQ870	£355	£39	£6
LQ1060	£585	£155	£6
LQ1070	£310	£69	£6
LQ1170	£434	£69	£6
LQ2550	£669	£360	£6
LX100	£114	£–	£4
LX400	£92	£69	£4
LX850+	£134	£69	£4
LX1050	£203	£125	£6
SQ870	£419	£170	£23
SQ1170	£555	£155	£23
SQ2550	£669	£–	£23
Stylus 800	£219	£–	£10

Epson RS232 Interface

Standard £28; +8K Buffer £75

- LQ100 Tractor Feed £29
- FX850/LQ800/850 Tractor Feed £69
- FX/LQ1050 Tractor Feed £85
- LQ2500/2550 Tractor Feed £90
- Dustcovers for 80 col printers £6
- Stylus 800 Transparencies (50) £35

Canon Bubblejet Printers

	Printer	CSF	2nd Bin	Ink Cart
BJ10SX	£165	£43	–	£16
BJ200	£244	–	–	£16
BJ230	£280	–	–	£16
BJ300*	£305	£88	£88	£12
BJ330*	£369	£92	£79	£12
BJC800C	£1219	–	–	£16

- BJ10E/10EX/10SX/200/230 Jumbo Ink Refill pack (Jetfill Twin Pack) £12
- Optional Battery pack for BJ10EX/SX £33

* includes 12 months on site warranty

Fujitsu Printers

B100 Inkjet	£157
B200 Inkjet	£229
Ink Cartridge for B100/200	£14
Ink Refill for B100/200	£10

Professional Printer Stand

The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Its ergonomic design ensures smooth paper flow and automatic refolding.

80 Column version £16
132 Column version £25

Perspex Printer Stand

Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version £14
136 Column version £18

Universal Printer Sharers

Connect up to 4 Micros to 1 printer or 4 Printers to 1 Micro with our combined, Sharer/Changer switch boxes.

Standard Low Cost Sharers

Connects	Serial	Parallel
2 to 1	£8	£9
3 to 1	£11	£12
4 to 1	£15	£16

Professional Sharer Units

Connects	Serial	Parallel
2 to 1	£12	£13
3 to 1	£15	£17
4 to 1	£24	£26

Auto Printer Sharer Switch

Connects	Serial	Centronics
• 2 to 1	£27	£29
• 4 to 1	£44	£45
• 8 to 1	–	£75

256K Multi Spooler

These Parallel Auto printer sharer switches have built-in 256K Buffer.

• 2 In / 2 out **£99** • 4 In / 2 out **£115**
• 8 In / 1 out **£149**

(Cables for all printer switches are from £5 each please specify the type required when ordering.)

Compact Converter Unit

Serial to Parallel & Parallel to Serial **£32**

Listing Paper

- 1,000 Sheets 9.5" x 11" Fanfold **£7**
- 2,000 Sheets 9.5" x 11" Fanfold **£11**
- 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold **£21**
- 1,000 Sheets 15" x 11" Fanfold **£9**
- 2,000 Sheets 15" x 11" Fanfold **£16**
- 1,000 Sheets true A4 Fanfold Paper 70gms **£11**
- 2,000 Sheets true A4 Fanfold Paper 70gms **£21**
- 500 Sheets A4 80gms Bond **£3.50**
- 500 Sheets A4 90gms Cartridge for Ink Jet/Laser printers **£9**

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Cross Over Manual Switch

2 In/2 Out Parallel	£29
2 In/2 Out Serial	£28
3 In/2 Out Serial	£36

Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
BBC B/BBC Master	–	£6.00
Archimedes Micro pair	–	£9.00
Citizen 120D	£3.25	£6.00
EX800/1000	£6.00	£6.00
RX/FX80/85/800/MX80	£2.95	–
FX/MX/RX100/1000	£3.95	–
Kaga/Taxan KP810/815	£6.00	£6.00
LQ400/500/550/800/850	£5.50	£6.00
LQ1050/LQ2500	£12.00	£6.00
LX400/800/850	£3.50	£6.00
M1009/GLP	£2.95	£6.00
NEC P2200	£4.50	£6.00

Dust covers for most 80 column printers available at £6 each

Printer Labels

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£4.50
1,000 90 x 36mm (Twin Row)	£4.60
1,000 90 x 49mm (Twin Row)	£4.95
1,000 102 x 36mm (Twin Row)	£4.70

Laser Printer Labels on A4 Sheets

3750 – 70 x 29mm (3 Rows x 10)	£15.50
2400 – 70 x 37mm (3 Rows x 8)	£15.25

24-Hour Credit Card Order Line
(0582) 74 55 55 / 48 77 77

Psion Series III

- Series 3 Computer128K **£108**
- Series 3 Computer 256K **£159**

RAM Solid State Discs (SSD)

• 128K **£48** • 512K **£97** • 1Mb **£199**

Flash Solid State Disc (SSD)

• 128K **£30** • 556K **£48** • 512K **£79**
• 1Mb **£139** • 2Mb **£199**

Communications

- Parallel Interface Link **£25**
- RS 232 Serial Link for PC **£58**
- RS 232 Serial Link for Mac **£59**

Various

- Mains Adaptor 9V AC **£12**
- Spreadsheet **£59**
- Professional Finance **£42**
- Spelling Checker/Thesaurus **£42**
- Desk Stand **£15**

Commander Joystick

- Connects directly to BBC Analogue port
- Fully compatible with all BBC Joystick controlled games.
- Switchable springs allow selection of floating or centring operation.
- Trim adjusters for both X and Y axes for fine centre adjustment.
- Convenient stick mounted fire button with additional base buttons.

Price: £15

Surge Protector Plug

Fitted in place of your normal mains plug, this device protects your equipment (and data from corruption), against mains high voltage translent spikes/surges caused by lightning or thermostats switching.

Protection for only **£8.50**

Beeb PC (BASIC)

Designed for program authors to convert BBC programs to run on IBM PCs.

Price: £38

Beeb DOS

Allows IBM PCs/Compatibles to read Acorn format Discs

£39

Plotters

• DXY1100 **£650** • DXY1200 **£835**
• DXY1300 **£1049** • Sketchmate A4 **£349**
• Sketchmate A3 **£495**
• Roland Plotter Fibre Tip Pens **£7.50**
• HP7440AU **£665** • HP7475AU **£899**
• HP7570A **£POA** • HP7575AU **£2529**

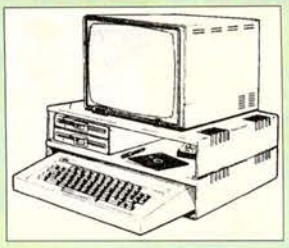
Watford Catalogue

200 Page full colour catalogue/ Technical Guide now available.

Tel 0582 48 77 77

for your FREE copy

Plinths for the BBC Master and A3000



- Single 490 x 310 x 105mm **£14**
- Double 490 x 310 x 210mm **£27**
- A3000 Single Plinth (very sturdy & precision made), has a slot on the left for the switch & cut out on the right for 3.5" Disc Drive **£15**

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip.

Copy Holders

• Desk Top **£8;** • Angle Poise **£12**

Copy holders as above but with a battery operated, remote controlled cursor/ruler. (By hand or foot pedal.) (Batteries 2 x AA not included.)

• Desk Top **£15;** • Angle Poise **£20**

4 Way Mains Distribution Socket

4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required.
Very useful for tidying up all the mains leads from your peripherals. **£9.50**

Aries Spike Cleaner Unit

A 4 way mains distribution unit as above with a built-in Surge Arrester, providing protection for your complete Computer/Hi-Fi System **£16**

Mouse Cleaning Kit

To obtain trouble free operation and prolong the life of your mouse, the high tech rodent requires regular cleaning. Our deluxe mouse cleaning kit is ideal for the purpose **£3**

Archi Mouse Port Splitter

Our handy little splitter unit eliminates the risk of damaging your micro due to constant plugging and unplugging of the mouse by allowing you to connect both, a joystick and a mouse simultaneously to your Archimedes. **£10**

WE Mouse House

Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive etc.

Only £3

Spares for BBC Micro

UHF Modulator	£4
Speaker **£3;** Speaker Grill	£1
Keyswitches	£1
16MHz Crystal	£2
17.734 MHz Crystal	£2
32.768MHz Crystal	£2
Replacement 17 way Flexible Keyboard Connector	£4
BBC Master Power Supply	£69
BBC Master Keyboard	£62
BBC Master Casing	£49
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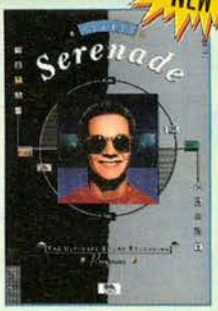
READER OFFERS

Acorn COMPUTING

Serenade

NEW



This is a desktop Multi tasking, 16 track Midi sequencer for Acorn machines. A great deal of effort has gone into creating a graphical user interface that gives access to the power of Serenade without making it complex to use. Some of the many features include:

- Fully RISC OS2 and 3 compliant.
- Accurate keyboard capture.
- Intuitive interface (using piano roll display).
- Auto drop which allows your to insert notes in real time whilst re-playing.
- Guitar windows which allows chord input offering an alternative to the standard keyboard.
- Scores to Rhapsody via Standard Midi format type 1

It can also generate Real Time Midi events which enable real time mixing, panning, record etc with convenient snapshot facility and has remote control triggering via MIDI keyboard.

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Render Bender II

Render Bender II is another top rated graphics package from Clares. It is a powerful ray tracing package which consists of four applications:

Illuminator - a graphical front end to Render Bender which enables you to create Render Bender files using a graphics program similar to Draw.

Render Bender - the Ray Tracing part of the package. It takes a file from Illuminator and generates a ray traced image.

Animator - takes a sequence of screens and delta compresses them to produce an animated sequence.

Converter - converts compressed screens into sprite files and enables you to extract individual screens from an animation file.

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Rhapsody II

A score writing program which has been designed to allow you to create and edit your own musical scores. You can enter your music by hand one note at a time, drag the notes on to the stave or you can even use a Midi instrument to capture music in real or step time.

If you have a Midi instrument attached to your Archimedes you can play a part and then transcribe it on to a stave. This can be repeated and each part entered via the Midi keyboard and transcibed on to the appropriate stave. And of course you can play your score back through the Midi Keyboard.

The package features automatic beaming, up to 24 staves, changes of tempo and volume, ties, triplets, user defined trills and so on.

When your masterpiece is complete you could print the whole score or individual parts in the usual way.

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Elite

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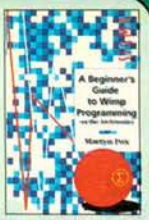
A Guide to WIMP Programming on the Archimedes

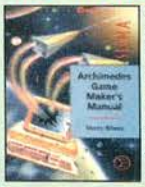


This book introduces the techniques to create applications that use the Wimp environment – Windows, Icons, Menus and Pointers. This means that the program runs under Desktop and also achieves multi-tasking – running at the same time as other software. Your creation can have the same appearance and 'feel' as commercially-produced packages, for example by using the standard RISC OS method of dragging an icon to load and save files. Everything is presented step-by-step – with each step fully explained and followed wherever possible by running the program and observing the result. The text is illustrated at intervals by pictures taken from the screen.

£12.95

Archimedes Game Maker's Manual

£14.95



Now you can find out how to use your Archimedes and Basic 5 to build high quality games whether for education or for recreation. Ideal for the experienced or novice Basic programmer, Terry Blunt takes you through the seven major aspects to writing a successful and professional product: Planning a game; Critical games stages; Graphics and animation; Arcade games; Role playing games; Strategy games; Professional tips and tricks. You can see the principles laid out in fully tested listings. This book is sure to become an essential reference written in an informative and easy to read style. If you want to know how to use the Arc's graphics capabilities and sprites to full advantage and make better games, buy this book now. It's the only one you'll ever need - quote from *Micro User August issue.*

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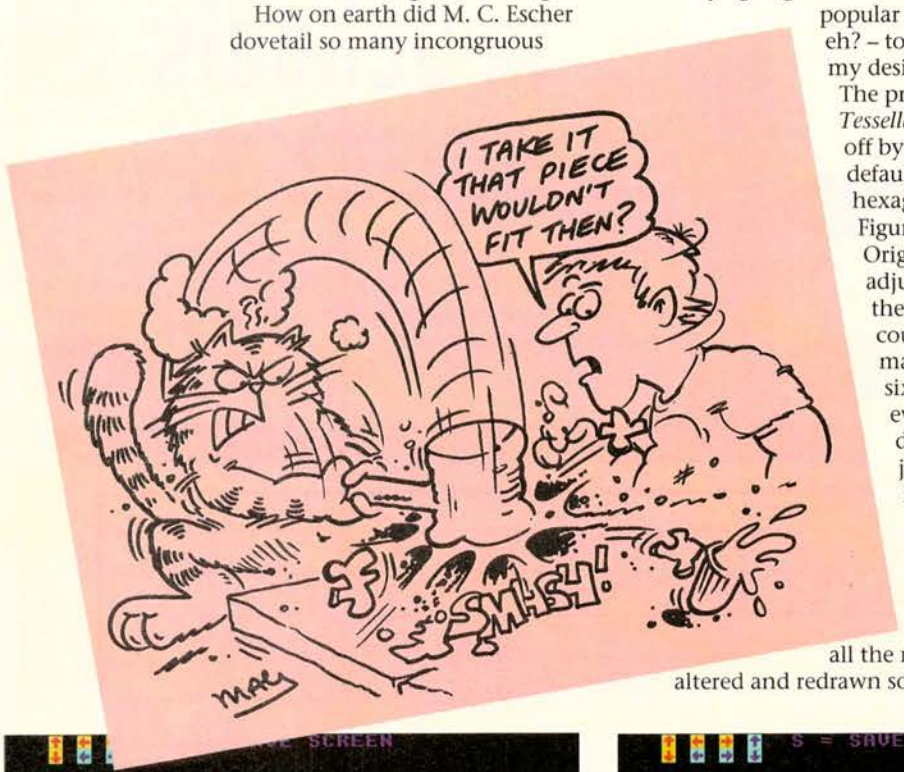
Tessellations, that's

Mike Goldberg wants to beat the rest with this fit together

ONE of my favourite mathematics topics at school was Tessellations – the fitting together of a repeated shape or shapes to form a seamless and infinite mosaic. Of course, bees beat us all to it with the use of regular hexagonal cells for the interior of their hives. But what about more complicated shapes?

How on earth did M. C. Escher dovetail so many incongruous shapes together? I reckoned that a lot of tracings and repeated drawings were perhaps cut out and laid next to each other.

Many years ago I decided to create a complicated tessellation in this laborious fashion but gave up as often as I tried. So it was with renewed eagerness that I set out to use my ageing 32-bit dinosaur – popular this year eh? – to help me in my designs.



The program *Tessellate* starts off by drawing a default grid of hexagons, see Figure I. Originally, adjustment of the hexagon could only be made at the six nodes but eventually I divided the joins up into 24 nodes.

By just changing one hexagon all the rest are altered and redrawn so you have instant results, as shown in Figure II. By filling in the shapes, Figure III, you can see the resultant inbetween shape created left in the background colour (black). With repeated editing unexpected shapes often occur which you really would not dream up otherwise.

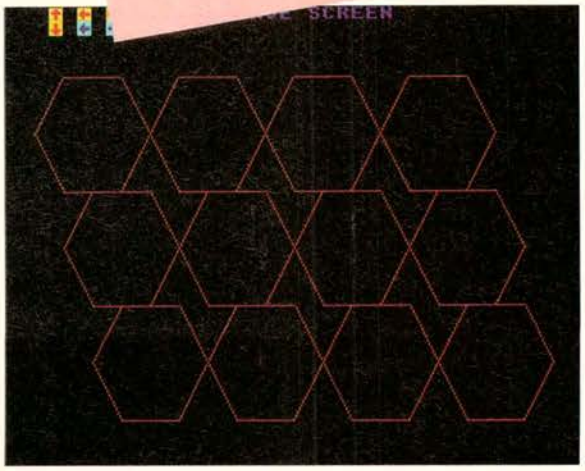
Each shape can be moved in relation to its neighbour horizontally or vertically and the whole row or column can be shifted similarly. Using these shifts the variety of patterns produced is virtually endless, see Figure IV.

The program produces monochrome images with a maximum of 24 nodes per shape but really this should only be a guideline. The idea is to modify the shapes until the outline suggests various objects or animals and then save the screen.

You can then load the saved screen into !Paint and isolate just one shape and draw in the detail – taking care to keep within the borders of the shape itself.

By adding a mask outside the borders you now have a tessellating sprite which by consecutive printing will produce a nicely detailed tessellation, just think of the wallpaper you could design.

All the designing is done with the mouse – click Adjust anywhere on



● *Figure I: The rows and columns can be shifted in one go*

● *Figure II: 24 points on each hexagon can be modified*

● *Figure III: You can fill the*

what you need

puzzle

the screen and the top left hexagon will turn blue with magenta circles denoting the points you can alter – clicking Select now will cancel the operation.

Click Adjust again only this time on one of the circles – the circle will enlarge around the point to be altered. Move the mouse to where the new point is to be and again click Adjust – a green circle appears at the new coordinate. Now click Select to fix the new shape.

To fill the shapes in solid colour click Select anywhere inside the top left shape – it will only work in this one. Don't worry if you miss and the background is flooded with colour – just try again with better aim!

The arrows at the top left of the screen allow you to shift the mass of shapes around. Clicking Select on the red ones moves the individual shapes closer together or further away. The blue ones shift rows and columns – try them to get familiar with what they do.

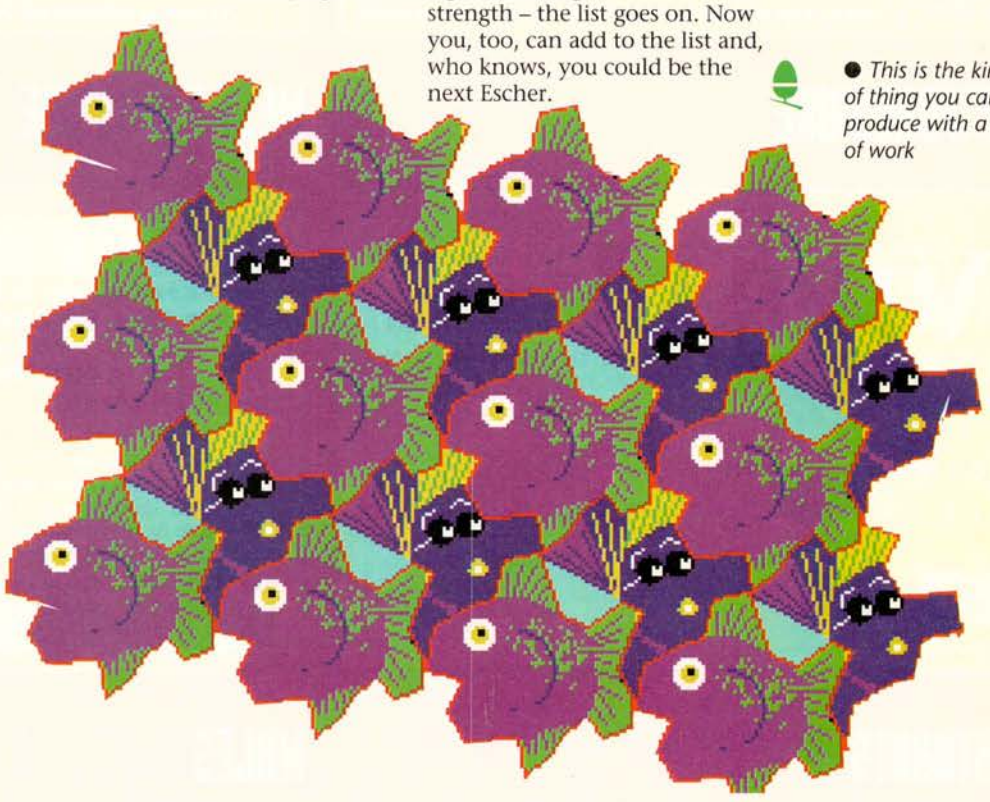
When you are happy with your masterpiece press *S* to save the screen. The file will be saved prefixed with *tess-* followed by an incrementing number.

At this stage you will have a file ready to edit in detail. To show willing I have created a crude but effective example with the almost amusing title *FishHead*.

If you look closely you will notice that the world depends quite heavily upon tessellations for all manner of things.

Structures like houses rely upon rectangular brick patterns – even footballs are a spherical combination of hexagons and pentagons – like the latest find for a carbon molecular state.

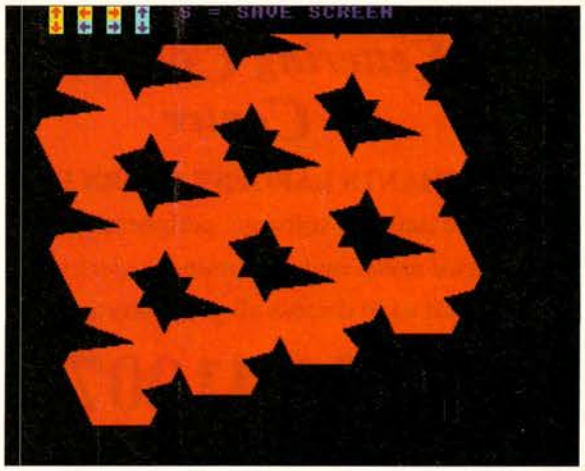
Bridges invariably include repeated triangular sections for strength – the list goes on. Now you, too, can add to the list and, who knows, you could be the next Escher.



● *This is the kind of thing you can produce with a bit of work*

shapes with a simple click

● *Figure IV: Slide the shapes around for interesting effects...*



...and fill again

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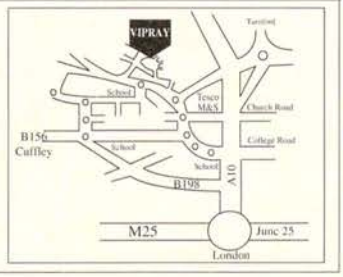

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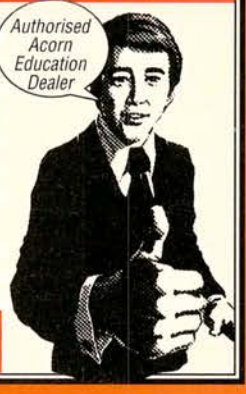

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Acorn vs the world?

ON A daily basis I use an A5000, Apple Mac Quadra 950, 486PC clone, Data General mainframe mini system, Unix and Novell networking. I find the RISC OS operating system easiest to use, despite its lack of certain features aimed at the more *serious* user which appear on the Macintosh and PC.

Many of my business colleagues, friends and associates who have seen RISC OS in operation have turned their heads and been impressed by its ease of use and speed. However, they all commented that the graphical interface seemed inferior to that of the Macintosh or Windows.

Acorn have a top class product: Surely all it needs is tidying up around the edges and a marketing campaign suitable enough to entice the serious business user? – **John Peggs, Newton Abbott**

In a similar vein

FOR the past 15 years my job has revolved around computers: Currently I am a senior technical analyst on mainframe systems and although only using IBM products at work I choose to have Acorn equipment at home. My Archimedes is even used for 24 hour remote support of the mainframe.

Upon my recommendation, my brother who lives in Bermuda bought an A5000. He works as a technical analyst on DEC VAX, PC's and LANs, and despite only having had his machine four months has become very defensive of it.

He has demonstrated his machine to many friends – including teachers – and even a senior partner in a law firm: All were impressed, and wondered why the machine was not marketed there or in their schools.

Although the current market is dominated by PCs, many of those who buy them struggle to use them. The Archimedes *is* in a position to challenge them if only you can get people to see past the price tag with some proper marketing. – **Andrew Keeble, Ipswich**

● *While the widespread attitude that the PC is the* only *solution for* all *computing needs persists it is hard for companies such as Acorn to make inroads. Their poor marketing history certainly does not help, although they appear to be improving. All we can hope is for future machines to have sufficient features and advertisement to draw the public's attention.*

The fact is that the only way to convince people is to get them to use *the machine, you can't tell by looking at it. As a test we asked one of our ad setting staff what he thought of the A5000 he uses specifically for* Acorn Computing *as opposed to the Mac he uses the rest of the time.*

His main thought was that the menus were much better than the Mac, where you can only pull-down main menus from the top of the screen, rather than have them pop-up wherever you click the Menu button. It may not seem much but it's a start.

User-friendly desktop

READING the letter from D. Lewis in the September edition of *Acorn Computing* prompted me to do something I should have done a long time ago – to praise Desktop Projects for all their help during the years I have dealt with them.

I can honestly say that never has any problem been too small for them to look into even if it was, at times, self-inflicted. Nor have I had modifications or add-ons fitted in such a consistently competent manner.

It makes a refreshing change to be able to buy something without worrying later if you have had a good deal. Genuine, enthusiastic companies like this are the backbone of the Acorn world without which Acorn would have died long ago. – **Mark Flemming, Hawarden, Clwyd**

Electron lives on

I ENJOY reading *Acorn Computing* but am disappointed at the lack of information contained in it regarding the Electron. As a subscriber I have been receiving 5.25in disks which I can use at work on the college BBC Micros, but as my drive at home is 3.5in I can't use them there.

I am currently using my micro to run a pen-pal connection service: It is open to everyone and all entries will be welcomed. If under 18, please include your age. – **Paul Matthews, Portland College, Nottingham Road, Mansfield, Notts. NG18 4TJ**

● *Since changing to* Acorn Computing *our level of support for 8-bit machines has become, to some extent, stronger and certainly more consistent than it had been: Four new programs every month – written exclusively by other readers – cover a wide range of interests, with a large helping of PD software whenever possible.*

All that has really changed is we no longer print listings. We can only review new products for the older micros as they become available – and sadly few are being released. Lengthy Electron/BBC Micro specific features are no longer viable simply because our readership is so heavily slanted towards the 32-bit range.

The cassette production was terminated as the level of demand fell to virtually nothing – we stopped when

Game on for compatibility

PRIZE LETTER

THERE were some letters published in the August issue of *Acorn Computing* on the subject using certain games on different machine configurations. Hopefully, the following comments may be of assistance.

Early versions of the Wonderland adventure game could not be installed on to a SCSI hard drive and produced similar error messages to those reported by Chris Ayling. I was able to obtain a fix for this from Magnetic Scrolls via Norwich Computer Services and it has successfully functioned under all versions of RISC OS and both IDE and SCSI.

Perhaps his hard disk interface is third party and does not behave in the same manner as the Acorn IDE/ADFS interface on my A5000.

Two other things I have discovered about Wonderland are that it cannot be installed as a compressed application using Compression or SparkFS and that the hard disk installation program is incompatible with Atomwide's VIDCplus application under Risc OS 3 or above.

In response to the letter from G R West, I have found Domark's MiG-29 Fulcrum will work on an A5000 under both Risc OS 3 and 3.1 and on an A310 running RISC OS 3.1. Perhaps there is more than one release version – mine includes a ReadMe file dated March 91.

Additionally, I have also found Interdictor II will fail when attempting to run it in conjunction with VIDCplus. – **R. A. Brown, Tadworth, Surrey**

less than 100 readers required them. Production of the Compact 3.5in disk is being wound down too with no new subscriptions.

Our support for the older Acorn range through the 5.25in disk will, though, be kept up for as long as possible: Keep on subscribing to Acorn Computing *to ensure our continuing coverage for your micro.*

Ethical considerations

I AM trying to decide upon a replacement for my aged BBC Micro on which the colour has recently failed. Alongside it I use a modern bubblejet printer, 5.25in disk drive and TV set.

Really I'm looking for an updated version of my current system: The speed of the thing is not really of interest, just so long as it allows me to continue wordprocessing – preferably in Wordwise. What do you suggest? A BBC Master, perhaps? – W. S. Jones, Kenilworth

● *First of all, your machine may not be quite as dead as you think: The loss of colour is probably due to the failure of the TV modulator, which could be replaced very cheaply by a computer engineer. However, after saying that, it may be reaching the stage where one problem is quickly followed by another.*

As you have been happy with your current set up and don't require a brand new, faster micro such as the Archimedes, a second-hand Master 128 would be a good choice.

Acorn only ceased production of this machine recently and the oldest units are still some four years younger than your current micro.

The Master produces slightly clearer TV displays than the standard BBC Micro and comes with the View wordprocessor fitted as standard.

This operates quite differently to Wordwise and is generally more complicated – but there's nothing to stop you transferring your Wordwise chip from your old micro to the new one.

Debugging in RISC OS 3

DEBUGGING Wimp applications in RISC OS 2 was quite straightforward. You can run them from Basic and then quit to analyse the variables. With RISC OS 3 this is not automatically possible – but using the following method it can be done.

Load your program into Basic and add these lines before the *Wimp_Initialise* command:

```
MOUSE ON
SYS "Wimp_ForceRedraw",-
1,0,0,2*1024,2*1024
SYS "Wimp_CloseDown"
```

After quitting your program and returning to Basic the actions of the Escape and cursor keys may have been altered by the Desktop. Type:

```
SYS "OS_Byte",4,0
SYS "OS_Byte",229,0
```

to remedy this. – **Terry Adams. Chirnside, Berwickshire**

Sprite files revisited

THE letters pages of your September issue carried a query from Bruce Roney regarding changing the directory icon. I have been using the following process to make my desktop look different – it involves creating an application which works like a directory.

From the Filer menu create a new directory – it can be called anything you like, but must begin with an exclamation mark. Shift+double-click on the generated application to open its directory.

Using Edit, create an *obey* file containing these three instructions:

```
Set Alias$Temp Filer_OpenDir <Obey$
Dir>.Files
Temp
Unset Alias$Temp
```

and save it as *!Run* inside your new directory. Now, using !Paint create a sprite 34 pixels by 17 in Mode 12 – 34 by 34 if you have RISC OS 3 and use high resolution modes such as 27 and 31 – with the same name as the directory you created earlier.

When you are satisfied with the design, save the file as *!Sprites*.

Finally, create a new directory called *Files* inside the application – this can then be used just like any other directory.

The next time you use the micro the directory will appear with the new icon. Repeated use of this method allows for a much more colourful desktop. – **M Hatton, Luton, Bedfordshire**

Go-faster sprites

ALTHOUGH a reasonably competent programmer in Basic, I have only just begun to learn ARM Assembly language.

One of my first attempts was to convert a simple sprite animation program I had written in Basic as it was slow and suffered from terrible flicker.

However, there was no noticeable speed difference and the flicker was just as bad. Does this mean that SWI "OS_SpriteOp" in assembler is no faster than SYS "OS_SpriteOp" in Basic?

If so, how can I speed up my plotting? – **Graham Borland, Stromness, Orkney**

● *Every SWI routine is identical to its SYS counterpart – they both call the same piece of previously written ARM code.* OS_SpriteOp *is an extremely versatile function as it has to cope with every possible screen mode and because of this it's not particularly fast. If you want to plot sprites in the quickest possible way, you'll have to learn how to write to the screen directly.*

Having said that, the way to reduce flicker is to employ dual-screens using OS_Byte *calls 112 and 113. With this you display one bank of memory while updating the other. When this new* frame *has been built, you switch the display to this bank – giving what appears to be an instantaneous update – and begin to work on changing the other.*

For further details it is best to refer to the RISC OS Programmers Reference Manual in conjunction with an ARM assembler tutorial book. For complete details on screen bank switching from a games viewpoint there's The Archimedes Game Maker's Manual by Terry Blunt.

Artworks for everyone

VARIOUS publications have recently suggested that, for most people, producing a picture in Artworks would be a slow process. As a professional graphic, airbrush artist I feel this is rather maligning to an excellent package with which I believe almost anyone could fairly quickly and easily produce art of a high standard.

It is my experience over the last 23 years that the problem with *budding artists* is they feel it necessary to use all the complex tools in every composition to get the effect they want. Usually only the simplest are really required. – **Walter Briggs, Donaghadee, County Down**

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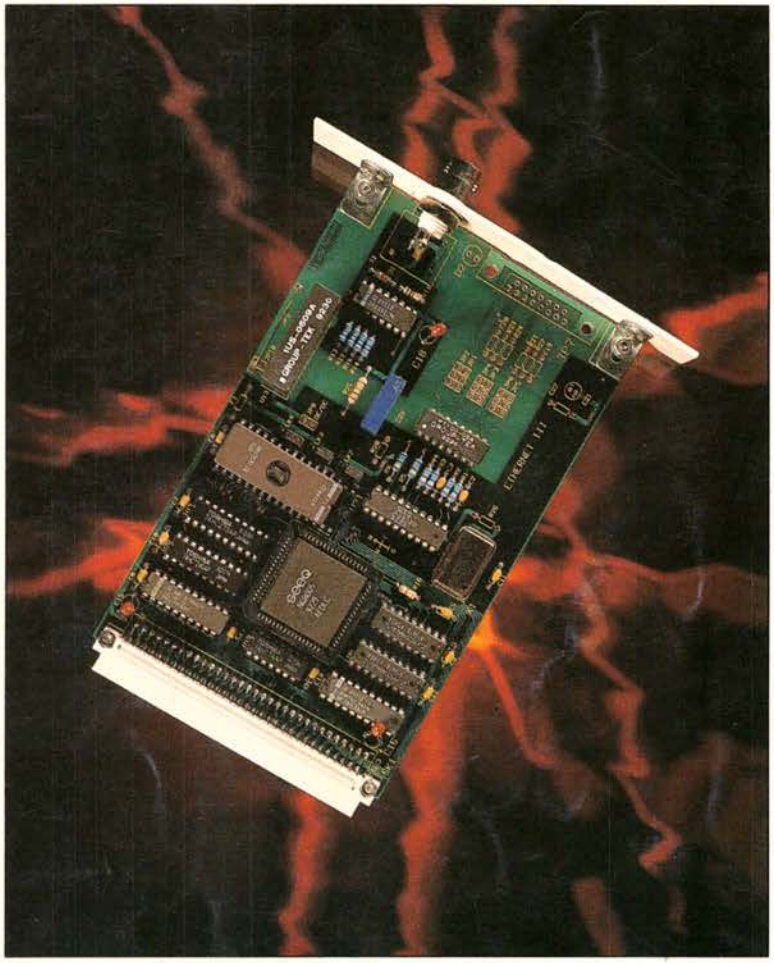

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